The Understandings of Credentialed Diabetes Educators and Patients about Teaching and Learning in Diabetes Education

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SUMMARY

Diabetes is the world's fastest growing chronic disease (International Diabetes Federation [IDF], 2013). If untreated or poorly managed diabetes leads to life-threatening complications, early mortality and significant costs to the individual and the health care budget.

Type 2 diabetes can be treated with a combination of diet, exercise, tablets and/or insulin. Education about each of these treatment components is critical for the person with diabetes to enable them to learn how to self-manage their condition to achieve normal blood glucose levels and reduce complications. The outcome of diabetes education is of substantial importance, both in immediate diabetes management by patients and to reduce demands onr the wider health care system.

The literature on diabetes focuses on clinical management whilst noting that diabetes education is important and beneficial. Whilst there is a large body of education literature, there is limited literature about teaching and learning in diabetes education with minimal detail about how diabetes education should be designed to generate effective learning in patients.

Educational research literature provides evidence that when learners use effective learning strategies they build powerful knowledge and can solve more problems in the area of their study. So if patients experience effective teaching it is expected that their learning about the management of their diabetes will be effective.

This doctoral study is a qualitative investigation into the knowledge and understandings held by diabetes educators and patients about teaching, learning and of their roles in diabetes education.

Transcripts were coded using three different frameworks developed from research literature on teacher knowledge, on learning processes and on the evaluation of the quality of knowledge about teaching and learning.

The analysis identified that patients understand they need to be active learners, ask questions, and can identify aspects of how they prefer to learn.

The teacher knowledge classification analysis identified that the credentialed diabetes educators (CDEs) have knowledge about diabetes clinical management

(content), general pedagogical knowledge (GPK) and knowledge of learning. Although the CDEs have this knowledge, there is concern about the low level of pedagogical content knowledge (PCK)—knowledge that can be used by the educator—to guide the new patient through the learning of quite complex information.

The CDE’s knowledge about teaching and learning was limited in both detail and quality thus reducing the prospect of the CDE generating effective solutions to teaching or learning problems that emerge during an education session. The limited theoretical range of knowledge and understandings about teaching and learning held by the CDEs also reduced the likelihood of patients developing strong, effective knowledge for self-management.

This absence of quality knowledge about teaching and learning is not dissimilar to the situation of educators in other fields. However, in diabetes education, it is critical because it impacts on the health and lifestyle of millions of people with diabetes around the world and ultimately on health budgets.

DECLARATION

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Signed ______________________________

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My PhD journey began prior to a number of major and unexpected life events. The death of my father Frank Hill, personal illness, my wedding and the birth of my two beautiful children significantly delayed my research activity and the writing of this thesis. However, this time and these experiences taught me the value of health and reinforced the importance of education about health for all.

I dedicate this thesis to my insightful husband Peter and wonderful children David and Olivia for showing me different ways to learn.

CHAPTER 1

INTRODUCTION

Overview and Purpose of this Study

Diabetes mellitus is the fastest growing chronic disease around the world (IDF, 2013). In Australia, there are 956,000 people with type 2 diabetes, the most common (85-90%) of all types of diabetes mellitus. The total financial cost of type 2 diabetes in Australia in 2013 was estimated at $10.3 billion with $5 million of this cost involving workforce productivity loss and health care costs (Diabetes Australia, 2014). These 2013 statistics have increased from the 2005 figures below, demonstrating the level of concern for what Diabetes Australia (DA) calls the silent pandemic.

About 900,000 Australians have type 2 diabetes; half are undiagnosed.

> - Diabetes is the underlying or associated cause of 8% of deaths.
> - Each year there are about three million consultations with doctors and 65 000 hospital admissions for diabetes.
> - Diabetes is estimated to cost the nation in excess of $3 billion annually.
> - The average annual cost for each individual with diabetes is estimated at $7566, of which $5325 is health care costs. The annual health care costs can rise to $9610 if there are complications.
>
> (Armstrong, Gillespie, Leeder, Rubin, & Russell, 2007, p. 485)

Diabetes management and care is expensive, with subsidised equipment for monitoring and injections, hospitalisations for complications and lost days from work for the person with diabetes (PWD) and their family members or carers.

If diabetes is poorly managed, it can cause a heart attack, stroke, blindness, kidney failure, impotence, amputations, coma or death. If left untreated people with this disease are more likely to experience life debilitating complications and a premature death. Poor management of diabetes is therefore a key issue for national and international health systems.

Recommended treatment for type 2 diabetes involves diet, exercise and medication. All of these recommended treatments require education, so the PWD can make decisions to prevent complications. Education is therefore critical to effective diabetes management. Education is critical because for the most part, diabetes has to be independently managed 24 hours a day, by the PWD or their carer.

In the light of its high-stakes nature, for the patient and for the health system, it is relevant to look at diabetes education as a teaching and learning event. This research considers how well a sample of diabetes educators in Australia emerges from investigation of their educational understandings when contemporary research on teaching and learning is used as the examining framework.

The purpose of this research was to explore and describe the understandings of the diabetes educator and the person with diabetes about teaching, learning and their respective roles in diabetes education.

Thesis Preview

Diabetes education is widely understood to be important and beneficial in diabetes management (Colagiuri, Girgis, Eigenmann, Gomez, & Griffiths, 2009). There is a large body of literature about diabetes education with its focus on knowledge acquisition, behaviour change, empowerment and goals of clinical management. There is very little research in diabetes education about detailed teaching and learning processes which is surprising given that diabetes education as commonly practiced is clearly a teaching and learning activity, either one-to-one or when done in groups.

On the other hand, the detailed educational research on teaching and learning illustrates that when learners use effective learning strategies they build more powerful knowledge and so can solve more problems in the area of their study (Hattie, 2009). So if patients experience the use of more effective teaching strategies it is expected that their learning about the management of their diabetes will be more effective. For this to occur the CDEs need to have good quality knowledge about learning and teaching processes. It is this knowledge that is a major focus in this thesis.

The education literature on teaching and learning points to the major degree of influence that good quality teaching has on educational outcomes. Good quality teaching, based on good quality teacher knowledge, is associated with substantial benefit for learners. Good quality learning, based on good quality learner knowledge, is associated with substantial benefit for learners.

These influences on educational outcomes have not been given detailed attention in the field of diabetes education. Examination of the diabetes education literature indicates that there is little use of key findings that have emerged in the educational literature in the areas of teacher knowledge, knowledge of learning processes and the quality of this knowledge. This thesis research is designed to draw attention to this gap in knowledge by examining the understandings about teaching and learning held by diabetes educators and their patients. Three principal findings emerged.

First, the research found that the CDEs held general knowledge about teaching and learning but very limited knowledge about a key component of teacher knowledge, pedagogical content knowledge (PCK). PCK is critical because it is used by the teacher to help the student develop a good quality understanding of complex material that is to be learned. Second, the extent of CDEs' knowledge about key learning processes was uneven, with very limited knowledge about strategies to enable transformation, storage, retrieval and utilisation of new knowledge. Finally, the CDEs were found to possess teaching and learning knowledge which was limited insofar as it was mostly not embedded in a coherent theoretical framework, a framework that could be graded as representative of what Bereiter (2014, p. 4) describes as *principled practical knowledge*. One implication of this latter finding is that it would limit the ability of the CDE to generate and draw upon quality knowledge in novel and complex diabetes education situations. A further implication is that the quality of CDE knowledge about learning could potentially impact on the learning and subsequent management of diabetes patients.

Background

This section sets out the key concepts around diabetes with definitions for type 2 diabetes, diabetes care, diabetes self-management education (DSME), teaching and learning as will be used in this thesis.

Diabetes

Diabetes mellitus is a chronic condition which, once diagnosed, will affect every aspect of the person’s daily life. There is type 1, type 2, gestational and secondary diabetes. The most common type of diabetes is type 2 which affects approximately 85–90% of all people who have diabetes. Type 2 diabetes is usually diagnosed in people over 45 years of age and is the fastest growing health problem in Australia and across the globe.

Diabetes Care

Diabetes has been a National Health Priority in Australia since 1997 because it contributes significantly to the burden of illness and injury in the Australian community. Since 2008, the federal government has provided funding for diabetes care and education through enhanced primary care initiatives and now the general practitioner (GP) chronic disease management plans.

General practitioners receive a rebate via Medicare (public health funding system) for developing a GP management plan for a chronic diseases such as diabetes. Appointments for diabetes education, specialised diabetes management, foot risk assessment, nutrition and eye assessments are made as part of the annual cycle of care in the GP management plan for diabetes.

In addition, patients can access additional appointments with a private credentialed diabetes educator, dietitian, podiatrist, exercise physiologist, dentist, physiotherapist or psychologist. Under these arrangements a patient is able to access a total of five appointments per year with any combination of these health professionals in private practice as identified by their GP management plan. This additional arrangement is done when the specific health professional cannot be seen via the public system, either within a suitable timeframe or because the local health service does not have the specialist required in the team or town.

The funding of this plan by the federal government signifies the recognition of the importance of these health care services and specialist health care professionals in the management of diabetes.

Diabetes team

Diabetes care involves a team of people with the person with diabetes at the centre of the team. The core members of the diabetes team are the person with diabetes, their significant other/family, the diabetes educator, general practitioner, endocrinologist, dietitian, podiatrist, exercise physiologist, ophthalmologist and psychologist.

The person centred team approach is recognised internationally as a contemporary approach in diabetes care. Ultimately however, in most cases diabetes is managed by the person with the diabetes. Thus, it is to a significant extent a personal responsibility. It is not practical for the person living with type 2 diabetes to access their health care team daily so the person with diabetes needs to learn about effective self-management of their condition. In 1955, the founder of the British Diabetic Association, Dr R. D. Lawrence, stated that “the diabetic patient must be his own doctor, dietitian and laboratory technician. Hence, education is the single most important aspect of treatment” (cited in Royal College of Physicians of London Committee on Endocrinology and Diabetes Mellitus & British Diabetic Association, 1984, p. 1).

An essential ingredient in diabetes care is the education about how to modify diet, incorporate exercise into daily life, administer medications and monitor blood glucose levels (UK Prospective Diabetes Study [UKPDS] Group, 1998; Deakin, McShane, Cade, & Williams, 2005). Each of these components has a role in achieving tight blood glucose control for people with diabetes to prevent or delay the onset of complications.

The diabetes educator works with the individual and their significant other to develop skills in diabetes self-management.

Diabetes Education

Diabetes education is a specialty area of practice within health, predominantly undertaken by registered nurses. As diabetes increases in prevalence so too does the need for quality education about how to self-manage the condition. Education about self-management is important so the person with diabetes can make decisions about their diabetes and lifestyle.

Diabetes Self-management

Recently, the focus in diabetes education has been diabetes self-management education (DSME). DSME is defined as:

> the ongoing process of facilitating the knowledge, skill, and ability necessary for diabetes self-care. This process incorporates the needs, goals and life experiences of the person with diabetes and is guided by evidence-based standards. The overall objectives of DSME are to support informed decision-making, self-care behaviors, problem-solving and active collaboration with the health care team and to improve clinical outcomes, health status, and quality of life. (Funnell et al., 2007, p. 1630)

These objectives for diabetes self-management are admirable but the complexity of education is overshadowed when using biomedical parameters to measure the outcomes of education. The complexity of education requires evaluation of multiple layers and levels of teaching and learning rather than only physical data such as blood glucose levels.

A key aim of the diabetes education session is to enable the person to develop a body of knowledge about diabetes and its management so they can draw upon relevant information for their diabetes management as needed. If the education is successful the person will manage their diabetes independently and seek assistance only as needed.

The focus in this research on diabetes education is on the teaching of blood glucose monitoring. This element of diabetes management was chosen because it involves

- skill acquisition,
- knowledge of blood glucose levels, and
- interpretation of results.

Also, blood glucose monitoring is commonly taught to people with type 2 diabetes early in their education sessions, thus creating a common content for the different types of education sessions observed in the research.

However, quality education takes time and in Australia, despite increased funding, the number of credentialled diabetes educators and the time they are funded to provide diabetes education remains limited.

Time for Education

The issue of time constraints or limited time allocated for individual education was apparent in the Duke, Colagiuri, and Colagiuri (2009) systematic review.

This limited time for education is a significant issue in the opportunity for patients to learn about their diabetes and the complexity of managing their blood glucose levels, diet, exercise and medication regimes. In most cases there is little time allocated for follow-up of patients' understanding of key concepts and any individual requirements such as the interactions of other health conditions and medications on the person's diabetes management.

In Australia, the initial diabetes education program typically ranges from 3 to 6 hours of education (Hill & Clark, 2008). It may be offered in groups or as one-to-one (1:1) education sessions. It may be scheduled as one full day or spread over three months. People with newly diagnosed diabetes may wait from one week to six months after diagnosis to be seen by a diabetes educator. These delays and inconsistent time allocations for education are potential barriers to the person with diabetes receiving timely information for self-management. So, while self-management is the desired outcome for diabetes education, time limitations for the education program can make this difficult to achieve. As time allocation is likely to remain limited, it is important to understand more about what happens in the diabetes education session to investigate ways to maximise its effectiveness.

Effective diabetes education

Effective diabetes education aims to enable the individual patient to become an effective self-manager of their condition. The effectiveness of management is often measured by the person's blood glucose level. Diabetes is considered to be ideally managed if blood glucose levels are between 4 and 7 mmol/L and their glycoslated haemoglobin (HbA1c) is less than 7%. At these blood glucose levels an individual's risk of complications is significantly decreased, as seen in the 10-year Diabetes Complications and Control Trial (DCCT) with type 1 diabetes and in the United Kingdom Prospective Diabetes Study (UKPDS) with type 2 diabetes over 20 years.

To achieve these glycaemic goals the individual needs to have the knowledge, skills and resources to self-manage their diabetes on a daily basis. In the two landmark studies, the DCCT (DCCT Research Group, 1993) and the UKPDS (UKPDS Group, 1998), participants were provided with more intensive education, frequent support by health professionals and regular monitoring of their progress than is commonly provided in Australian diabetes education. These studies demonstrated that increased education and management can be effective in decreasing complications. However, weekly education sessions and sometimes daily phone calls to adjust treatments and provide motivational support are not feasible or financially sustainable in most health systems. The cost of the UKPDS was 23 million pounds sterling (US$37m) from 1977 to 1997 for diabetes education and management across 23 sites for 5,102 patients. To achieve this intensive level of health care and education for the approximate 900,000 people with type 2 diabetes in Australia is not feasible or financially sustainable.

Understandings of Teaching

Diabetes educators have varied experiences and educational backgrounds. These factors influence their conceptions of teaching and learning and thus their understandings of their role as a diabetes educator.

Conceptions of teaching range from teacher-centred to student-centred, with a new emergence of a student-directed conception by van Driel (1997). This newer intermediate conception of student-directed teaching and learning is also evident in health care education but is more commonly referred to as *patient empowerment*. This approach has similarities to some views of adult learning and places a major level of responsibility for learning on the adult patient or student.

Significance of the Study

This study is significant because it provides insight into CDE knowledge about teaching and learning. This study examines the possibility that there are limitations in the CDEs knowledge about teaching and learning needed to enable effective learning about diabetes management. This study highlights the significance of CDEs holding both complex diabetes management knowledge and complex educational knowledge for them to be effective as diabetes educators.

Given the rising numbers of people with diabetes, effective education is critical to reducing complications and premature deaths from type 2 diabetes mellitus. Apart from the individual and family impact of complications and early death, reducing these effects will also decrease the significant costs to society associated with multiple hospitalisations, subsidised medications and diabetes related equipment and lost days of productive work by the person with diabetes and their carers.

Aims and Objectives of the Study

In diabetes education, the aim is to teach the person with diabetes to effectively manage their diabetes at home. To do this the person needs a range of knowledge and skills so they can monitor and manipulate their treatment in order to maintain normal blood glucose levels. Thus, a patient needs to construct the knowledge and skills in an accessible way so they can effectively interpret each diabetes situation and respond accordingly.

Therefore, this study investigated the understandings of both the diabetes educator and the patient about teaching, learning and of their roles in diabetes education for self-management. It is anticipated that there may be some differences in the understandings of their roles and responsibilities about teaching, learning and each other’s roles that is potentially limiting or restricting for the patient and their learning.

To investigate these understandings the following research questions were identified.

- What is the understanding of the CDE about their role when teaching BGM?
- What is the understanding of the patient about the CDE role when teaching about BGM?
- What is the understanding of the CDE about the patients’ role when learning about BGM?
- What is the understanding of the patient about their role when learning about BGM?
- What understandings do CDEs hold about teaching and learning?
- What understandings do patients hold about teaching and learning?
- What is the quality of the understandings held by CDEs about teaching and learning?

Overview of Chapters in the Thesis

The next chapter (Chapter 2) is the Literature Review which provides the details of research from both diabetes education and management literature and from the educational literature about teaching and learning. The absence of research into diabetes educators' detailed knowledge about teaching, learning and their role is identified.

The third chapter describes the methods and methodology used to collect and analyse the data from the CDEs and patients about teaching, learning and their respective roles in diabetes education.

Chapters 5, 6 and 7 present the findings from the three studies which make up the larger research thesis. Chapter 4 presents the findings from interviews with two CDEs and four patients before and after each of two education sessions. Chapter 5 presents findings from another CDE and two patients before and after a group education session. Chapter 6 presents findings from interviews of 22 CDEs from across the country via email.

The conclusions are provided in Chapter 7 with recommendations for diabetes education health professionals.

> Whether the learner is a school kid, a carpenter, cardiologist, or a CEO, if you want to understand learning and what is learned in any interaction you have to investigate from the point of view of that learner.
> (Brown & Duguid, 1993, as cited in Askell-Williams & Lawson, 2005, p. 88)

CHAPTER 2

LITERATURE REVIEW

Introduction

This literature review details the significance of type 2 diabetes and the burden it presents to individuals and the health care system in terms of complications and hospitalisations. The health literature specific to diabetes mellitus and health care surrounding the condition, along with evidence about the management of diabetes and the strategies known to reduce the incidence of complications are presented.

One of these strategies is diabetes education. A brief history of diabetes education and the development of the diabetes educator role are provided to understand how diabetes education has evolved. The review then moves to look more closely at the roles of the diabetes educator as teacher and of the person with diabetes as learner. This identifies a gap in the understanding of the diabetes educator's knowledge of teaching and learning, the patients' knowledge of teaching and learning and how their roles influence the process of diabetes education as a teaching and learning event.

The chapter moves to discuss the specific applications of teaching and learning strategies discussed in the extensive body of education literature which could be used by diabetes educators to provide effective education for people with diabetes during their initial education sessions. It is in this body of literature that the frameworks for analysing diabetes educator and patient knowledge about teaching and learning are identified for use in this research and the questions which drive this research are identified.

Diabetes Mellitus

"Diabetes mellitus is a serious and growing health problem in Australia and can result in major irreversible long term … complications" (Colagiuri, Colagiuri, & Ward, 1998, p. 16). "It is a chronic systemic disease characterised by either a deficiency of insulin or a decreased ability of the body to use insulin" (Fain, 2001, p. 1149).

The absence of or inability to use insulin effectively results in

- inadequate access to glucose for use as a source of energy, and
- increased glucose levels in the blood stream (hyperglycaemia).

Hyperglycaemia causes damage to blood vessels resulting in cardiovascular complications. The decreased energy affects ability to concentrate, learn and undertake the healthy lifestyle changes which positively affect diabetes management and long term health.

People with undiagnosed or poorly controlled diabetes will experience varying degrees of the following symptoms as a result of the raised blood glucose levels and the inability to utilise the glucose in the blood stream:

- fatigue or lethargy
- polydipsia (increased thirst)
- polyuria (increased urination)
- polyphagia (increased hunger)
- blurred vision
- glycosuria (glucose in the urine)
- delayed wound healing.

There are two main types of diabetes, type 1 and type 2. Type 1 diabetes is an auto-immune condition where the body destroys the insulin producing cells in the pancreas. It occurs mainly in children or young people and those affected require insulin to survive (Australian Institute of Health and Welfare [AIHW], 2010, p. 152).

Type 2 diabetes affects the largest group of people with diabetes, approximately 85% of all people with this disease. “People with type 2 diabetes produce insulin but may not produce enough or cannot use it effectively. Type 2 diabetes may be managed with changes to diet and exercise, oral glucose-lowering drugs, insulin injections or a combination of these” treatments (AIHW, 2010, p. 152).

People with type 2 diabetes are usually over 40 years of age at diagnosis and often present with additional cardiovascular conditions such as hypertension, peripheral vascular disease or angina, some of which may be complications of diabetes that has been undiagnosed. People with type 2 diabetes are the focus of this thesis.

Epidemiology

Diabetes mellitus has been considered to be at epidemic proportions in many developing and newly industrialised nations for some time (Zimmet, 1992; Silink, 2002; Alberti, K. G., Zimmet, P., & Shaw, 2007). Diabetes mellitus is an important condition because it “is a common condition that contributes significantly to premature mortality, morbidity, disability and loss of potential years of life” (Commonwealth Department of Health and Aged Care [CDHAC] & Australian Institute of Health and Welfare [AIHW], 1999, p. 1).

The incidence and prevalence of diabetes mellitus is rising throughout the developed world and rapidly rising in developing nations due to lifestyle changes (World Health Organization [WHO], 1994; CDHAC & AIHW, 1999; Dunstan et al., 2002). Its overall prevalence in Australia is approximately 4%, increasing towards 10% in people over 65 years and up to 20% among people in remote indigenous communities (Colagiuri, Colagiuri, & Ward, 1998; ABS, 2006).

In Australia, levels of obesity and overweight have increased by 15% since 1995 and the risk of obesity increases with age (Access Economics, 2008). In 1996, it was estimated that half of men and one in three women aged 18 yrs and over were overweight or obese (National Heart Foundation of Australia, 1996) and on average, Australian adults were gaining weight at the rate of one gram per day (National Health and Medical Research Council, 1996). Based on prevalence rates from anthropomorphic data (Dunstan et al., 2001) and the National Nutrition Study (1995), Access Economics in a report for Diabetes Australia estimated 3.24 million Australians (15.9%) were obese in 2005 (Shaw & Tanamas, 2012).

Diabetes is the fastest growing chronic disease with an estimated 1,000,000 Australians officially diagnosed with diabetes and others undiagnosed (Diabetes Australia, 2014).

In Australia, it is estimated that 275 people develop diabetes every day (Barr et al., 2006, p. xi). The national health report from the Australian Institute of Health and Welfare (AIHW, 2008b) estimated that 880,000 Australian adults over 25 years of age had diabetes in 1999–2000. This estimate was based on *The Australian Diabetes, Obesity and Lifestyle Study* (AusDiab study) and is equivalent to 7.4% of adults or more than 1 in 14. This estimate is of particular concern because almost half of these people did not know they had diabetes (AIHW, 2008a, p .194).

In 2009,

> diabetes (E10-E14) was the underlying cause of 4,170 deaths. 2009 had the highest number and proportion of deaths resulting from diabetes over the past ten years. The proportion of all deaths represented by this cause increased from 2.3% (3,006 deaths), to 3.0% of all deaths over this period. (Australian Bureau of Statistics [ABS], 2009, p. 11)

Diabetes is the sixth leading cause of death in Australia (ABS, 2009). In particular, heart disease, stroke and peripheral vascular disease occur 2-3 times more frequently in people with diabetes (ABS, 2006; AIHW, 2004).

Burden of the Disease

The total cost of diabetes has risen from an estimated $1 billion annually in 1996 (Diabetes Australia, 1996) to $34.6 billion in 2008 (Access Economics, 2008). This estimate includes costs such as days absent from work, medications, health care and equipment:

> Applying inflation figures, population growth and the new VSLY, the economic costs of Type 2 diabetes in 2008 are $34.6 billion, consisting of $12.4 billion in financial costs and $22.2 billion in net cost of lost wellbeing (Table 4-2). This is an increase of 57.3% compared with the economic costs of Type 2 diabetes in 2005. (Access Economics, 2008, p. 24)

Diabetes is costly for the individual with the condition but is also a significant burden on the health care system. “Diabetes was the principal diagnosis for 80,380 hospitalisations in 2005–06 and an additional diagnosis for 506,355 hospitalisations” (AIHW, 2008a, p. 198).

These hospitalisation figures are significant given that people with diabetes are no longer admitted to hospital for the commencement of insulin or wound management. These two common care requirements are now managed at home with the assistance of community nurses. Thus, the admission statistics are predominantly related to complications of diabetes or illnesses such as the flu to which people with diabetes are more susceptible. Ways of reducing the incidence of complications are therefore a priority for the health care system in Australia.

Complications of Type 2 Diabetes

There are short- and long-term complications of diabetes. The short term complications are ketoacidosis, hyperosmolar hyperglycaemic state (HHS) or hypoglycaemia. Ketoacidosis is rare in type 2 diabetes because insulin is usually still being produced by the body. HHS is possible if blood glucose levels are very high (> 40 mmol/L) and can lead to dehydration, confusion or coma if untreated. Hypoglycaemia is only possible in type 2 diabetes if the person is taking insulin or a type of tablet called sulphonylureas.

The long-term complications of diabetes are mainly due to high blood glucose levels that affect the blood vessels and nerves throughout the body (Harrison, O'Dea & Zimmett, 2002). The long-term complications associated with diabetes include high blood pressure, heart attack, stroke, blindness, kidney failure, impotence, leg ulcers and amputations, which result in severe disabilities for individuals. High blood glucose levels within the cardiovascular system cause irritation and inflammation to the blood vessels. To minimise the damaging effect of high blood glucose levels (BGLs) on the cardiovascular system it is important to maintain BGLs within the normal range (4–7 mmol/L).

The Diabetes Control and Complications Trial (DCCT Research Group, 1993) and the United Kingdom Prospective Diabetes Study (UKPDS Group, 1998) research demonstrated a significant decrease (up to 60%) in the incidence of complications among individuals who maintained tight blood glucose control within the normal range. This is a significant outcome given that the 2004–05 National Health Survey (NHS) "prevalence rates of stroke and heart attack among people with diabetes were twice as high as the rate among those without diabetes" (AIHW, 2008a, p.195).

> Type 2 diabetes is also the most common cause of severe kidney disease. In 2005, 697 Australians began kidney replacement therapy (dialysis or kidney transplant) due to diabetic nephropathy, accounting for 32% of all new cases registered in the Australia and New Zealand dialysis and kidney transplant registry for that year (McDonald et al. 2006). This represents an increase in the proportion of new cases of end-stage kidney disease caused by diabetes, from 25% in 2001. Of all people beginning kidney replacement therapy in 2005, 41% had diabetes, the majority Type 2.
> (AIHW, 2008a, pp. 195-196)

In addition to the healthcare costs and the effects of decreased health on the individual, people with type 2 diabetes will die 5–10 years before people without diabetes, mostly due to cardiovascular disease (IDF, 2007, p. 29).

To reduce the incidence of cardiovascular complications from type 2 diabetes it is important to adopt a healthy lifestyle and maximise other risk factors that benefit the cardiovascular system. A healthy lifestyle aims to reduce smoking and a high-fat diet whilst encouraging weight maintenance, regular physical activity and a high fibre, complex carbohydrate diet (National Heart Foundation, 1989; National Health and Medical Research Council [NHMRC], 2003).

Risk Factors

People at risk of developing type 2 diabetes are those with two or more of the following risk factors:

- over 40 years of age;
- family history of type 2 diabetes;
- ethnicity—Aboriginal, Torres Strait Islander, Pacific Islander, Maori or Polynesian;
- country of birth—South-East Asia, Middle East, North Africa, Southern Europe;
- gestational diabetes/baby over 4 kg;
- obesity, particularly central obesity (apple shaped people);
- hypertension; and
- hyperlipidaemia.

The risk factors for development of type 2 diabetes that are deemed modifiable, are related to physical inactivity and obesity. Exercise has beneficial effects in relation to body weight and fat distribution, blood lipids, blood pressure and the improvement of insulin sensitivity (Australian Diabetes Society, 1993; Australian Government Department of Health and Ageing, 2005).

To reduce the risk of obesity people need to follow the Australian dietary guidelines, be more active and maintain their weight within the normal range. This will also reduce the risk of developing hypertension and hyperlipidaemia. Thus, the focus of diabetes care is around diet, weight reduction and increased physical activity.

Overall, the Australian diet still includes components that are linked to diabetes and other health problems, for example, refined fats, sugars and alcohol (Australian Diabetes Society, 1993; National Nutrition Survey, 1995). Co-ordinated efforts to improve knowledge and behaviour change in relation to obesity and physical activity continue to be recommended by health professionals. Recent self-report data from the *National Health Survey, 2007-2008* (ABS, 2009) identify that “after adjusting for age, only 6% of Australian adults consumed the recommended daily amount of both fruit and vegetables” (ABS, 2011, p. 15).

After adjusting for age, obese adults were more likely than normal weight and overweight adults to:

- be sedentary or exercise at low levels for fitness, recreation or sport;
- exercise 2 or less days; and
- do no exercise

(ABS, 2011, p. 16)

When risk factors are not reduced, people develop type 2 diabetes. If these lifestyle factors are not modified following diagnosis then the cardiovascular complications of diabetes are likely to become more evident.

People with type 2 diabetes need to be instructed in a supportive and encouraging manner on how to manage their lives to achieve glycaemic control. This glycaemic control and how people with diabetes are instructed is a focus of particular interest in this thesis.

Diabetes Care and Management

Diabetes care typically incorporates dietary modifications, exercise, medication administration and blood glucose monitoring. Each of these components has a role in achieving and maintaining normal blood glucose levels for people with diabetes, which is the cornerstone of preventing or delaying the onset of complications.

An essential ingredient in this diabetes care is the education of patients, families and significant others about how to modify diet, incorporate exercise into their daily life, administer their medications and monitor their blood glucose levels, as indicated in Table 2.1. In Australia, diabetes education programs are available for people diagnosed with diabetes. However, not all people with diabetes access diabetes education as highlighted in the MILES study (Speight et al., 2011).

These programs involve a multidisciplinary team approach and typically include the diabetes educator, dietitian, podiatrist and possibly an exercise physiologist and psychologist. In addition, the team will communicate with the person's general practitioner (GP) and endocrinologist about their diabetes management. If the person has any complications of diabetes the team may also include an ophthalmologist, cardiologist, renal physician or vascular surgeon.

Table 2.1. Type 2 diabetes: goals for optimum management.

Element	**Goal**
Blood glucose level	6–8 mmol/L (fasting)
HbA1c	≤ 5.3 mmol/mol (range 48–58) ≤ 7% (range 6.5–7.5)
LDL-C	< 2.0 mmol/L
Total cholesterol	< 4.0 mmol/L
HDL-C	≥ 1.0 mmol/L*
Triglycerides	< 2.0 mmol/L*
Blood pressure	≤ 130/80 mmHg
Body mass index	< 25 kg/m^2 where appropriate
Urinary albumin excretion	< 20 mcg/min (timed overnight collection) < 20 mg/L (spot collection) < 3.5 mg/mmol: women (albumin-to-creatinine ratio) < 2.5 mg/mmol: men (albumin-to-creatinine ratio)
Cigarette consumption	Zero
Alcohol intake	≤ 2 standard drinks (20 g) per day for men and women
Physical activity	At least 30 minutes walking (or equivalent) 5 or more days/week (total ≥ 150 minutes/week)
Vaccination	Consider immunisation against influenza and pneumococcal disease, and the dTPa vaccine

Note. Adapted for ease of reading from RACGP (2014, pp. x-xi).

To achieve these biochemical and lifestyle goals, people with diabetes are strongly advised to attend an education program. The main aim of the education program is to work with people with diabetes to help them understand all of these goals and to develop the skills to achieve them. In the multidisciplinary team this is the main role of the diabetes educator.

The initial and ongoing costs of education are very small compared to the costs of regular consultations, hospitalisations and treatment for complications. Thus investment in diabetes education programs is designed to have a positive impact on the person with diabetes and thus reduce the effects associated with complications. The nature of effective diabetes education to achieve normal blood glucose levels is a focus of this thesis.

Diabetes Education

Diabetes education has been available for more than 30 years in Australia, and longer internationally.

The important role of education in diabetes has been noted over many years and has grown significantly since the days of Joslin (1919) in the United States and Lawrence (1925) in England, both of whom developed physician and patient manuals for diabetes education. In 1968, the Victorian Faculty of the Australian College of General Practitioners (ACGP) televised a three-week national education programme for physicians on Sunday mornings. Whilst intended for GPs, the content was presented simply and could also be understood by people with diabetes. This event was followed by the development of:

- the diabetic clinic at Royal Prince Alfred Hospital (RPA) in 1970;
- the RPA education program in 1971 and development of patient information videos;
- a public community education program in 1972 at the Newcastle Hospital (New South Wales) developed by Dr. Paul Moffitt; and
- an education program using the videos from RPA at the Royal North Shore Hospital (RNSH) in 1973.

In 1974, the New South Wales Health Commission (state government) funded the first research study (Webb et al., 1975) into whether non-compliance with a diabetic regimen was due to a lack of knowledge or motivation. The study developed innovative techniques to improve compliance, evident in the book *You've Got to Get Through the Outside Layer* (Tupling et al., 1981). At this time, compliance was measured by blood glucose levels in the normal range and patients followed the management regimes they were given by their doctors and diabetes educators. Significant improvement in patient compliance and improvement in individual care continued to be elusive (Martin, 1998) and generally in Australia complication rates, lifestyle changes and knowledge retention did not improve.

During the 1980s, in the United States of America, a large study called the Diabetes Control and Complications Trial (DCCT Research Group, 1993) was undertaken. In this study, people with type 1 diabetes participated in a regime of intensive therapy, including monitoring their blood glucose levels approximately 6 to 10 times per day. This is a significant increase on the usual 2 to 4 times per day (or less if they choose).

A similar longitudinal study (UKPDS Group, 1998) was conducted between 1977 and 1997 in the United Kingdom with people with type 2 diabetes and very similar outcomes were noted. One significant aim of each study was to keep participants' blood glucose levels between 4 and 7 mmol/L. To achieve this, people with diabetes were instructed in blood glucose monitoring at home and this aspect of education continues to be critical in the management of all types of diabetes.

Participants in both studies had been provided with significantly increased access to all health care professionals and monitoring devices. Diabetes educators were specifically used to assist participants with their understanding of the intensive regime, to provide education in diabetes management and blood glucose monitoring and to support and counsel them through difficult decisions/choices.

The outcomes of both studies demonstrated that if blood glucose levels are maintained between 4 and 7 mmol/L the incidence of complications was decreased by up to 60%. To achieve these blood glucose levels "the integral role of patient education as an essential component in intensive therapy aimed at optimising diabetes control and outcomes, was confirmed by the DCCT (1993)" (Colagiuri, Colagiuri & Ward, 1998, p. 26).

The studies remain the seminal literature in diabetes management and go some-way to demonstrating the benefits of intensive patient education. However, the generous level of access to educators included in the above US and UK studies would be difficult to sustain in any health care system.

Since the late 1980s, to address the problems of type 2 diabetes almost all major public teaching hospitals around Australia have developed a diabetes education centre with diabetes educators who conduct regular education programmes. In the light of the findings of the studies just noted it is clear that the education programs mounted in Australia should aim to include as part of their programs effective education about blood glucose monitoring (BGM). It is the education about BGM that is the focus of the content of the diabetes education sessions in this thesis.

Current Diabetes Education Approaches

Diabetes education programmes vary greatly in time allocation, content and mode, but it is common for each person with diabetes to be able to access up to five consultations of funded diabetes education per year in Australia courtesy of a specific Medicare item. Core topics such as what is diabetes, nutrition, exercise, blood glucose monitoring and foot care are provided in initial diabetes education groups and individual 1:1 sessions. Depending on the person's situation, more information and education about complications, insulin injections, hypoglycaemia, sick day management and the annual cycle of care monitoring may also need to be provided.

The most common current education scenario for a newly diagnosed person with diabetes is to be offered attendance at a group session. Groups range in size and length of session. Some groups are run over one full day, some over two half days, a week apart, while some are conducted as three 2-hour sessions on a weekly basis and patients can join in as they wish. If a person has English as a second language, has a complication or additional health issue, is treated with insulin. or prefers the privacy and confidentiality of individual education sessions, then they are usually offered such a session.

In general terms, individual education consists of three to five one hour sessions with a diabetes educator. During these initial diabetes education sessions the person's demographic data, health history and assessment information is collected. Education on a range of diabetes management topics with application to the individual's circumstance is provided. The person is also likely to be referred to a dietitian and a podiatrist for nutrition and foot-care assessment and education.

The format of the education sessions range from and include:

- a medical consultation—data collection and review with some prescription of care or treatment;

- information provision—the provision of information about diabetes, its treatment, lifestyle changes and the person’s role & responsibilities in their self-management;
- a review—check-up on their progress and any issues with their diabetes; and
- a counselling opportunity—focus is on the difficulties of living with diabetes and the psychosocial impact of the condition.

These formats form part of the *context* in which the initial diabetes education occurs. Not all of these formats are conducive to teaching and learning but all would be documented as *education* in the patient’s case notes.

Initially research on group education was able to demonstrate improvements in patient knowledge, confidence and adherence to self-care recommendations (Padgett et al., 1988; Brown, 1990).

However, individual education continued to be the most common context despite limited evidence of its effectiveness (Colagiuri et al., 1994; Colagiuri, Colagiuri, & Ward, 1998). A recent Cochrane systematic review by Duke et al. (2009) provided evidence of the limited effectiveness of individual patient education for people with type 2 diabetes on glycaemic control for people with a HBA1c above 8% (Duke et al., 2009).

> Although both psychosocial and health outcomes have been improved through a variety of diabetes education programs, reinforcement and ongoing self-management support is vital if these benefits are to be sustained (Funnell, 2004; Duke et al, 2009). (Colagiuri et al., 2009, p. 69)

Diabetes educators and teachers alike frequently note the need for more time, resources and staff to provide more effective teaching and learning opportunities. It is worth noting that the core curriculum for a person with diabetes covers a minimum of 6 core topics each needing approximately 60 minutes to present the information, check understanding and provide an opportunity for demonstrations and practice. However, on average, each patient is allocated three to five hours of individual education with a higher level of contact if they attend a group.

Diabetes education may occur in a purpose built diabetes education centre, in a makeshift office within a hospital or community health centre or in a doctor’s private practice/rooms. It is almost never in a school or educational institution. It is most likely to be in a health care institution or agency. Thus the context is one of health care rather than education.

In most sessions there would be information about content covered and some examples of teaching and learning. But when the total curriculum and expected learning outcomes are viewed from an education perspective, it is apparent that there are very substantial expectations about what needs to be achieved in this relatively short allocation of three to five hours of patient education.

The issue of sufficient time for completing the desired curriculum is not a new concern for educators. In addition to whether there is sufficient time to cover the curriculum, a significant issue is whether the patient can learn or construct the knowledge required to bring about effective management of the diabetic condition within the designated time.

To improve efficiency some education centres delegate activities not related to teaching and learning (i.e., current measurements of weight, waist and BGLs) to staff not involved in education. External counselling services are also sometimes used where possible, to enable the diabetes educator to focus on the teaching and learning to be undertaken during the education session. This is used based on the understanding that learning is limited when the learner is unable to pay attention due to fears, worries or concerns yet to be resolved.

Since the early 1960s the importance of education in diabetes care has been recognised and increased sufficiently to establish the role of a diabetes educator within most major health care institutions throughout the developed world. Whilst it is a sub-discipline of many health professional groups, it is seen predominantly as an area of specialist practice within nursing.

The Diabetes Educator Role

The evolution of diabetes education as a sub-discipline or specialty within nursing in Australia has occurred since the mid 1970s when the need for someone to provide more than just some basic instructions to people with diabetes was recognised.

The diabetes educator works with people with diabetes, and their families, to develop the knowledge and skills to manage their diabetes at home in a way that maintains normal glucose levels and minimises short and long term complications.

This is known as self-care or self-management education and is perceived as a cost-effective means of health care.

Since 1981, there has been an Australian Diabetes Educators Association (ADEA), which has supported all health professionals, but predominantly nurses, interested in diabetes care, education, management, research and policy development. The field has grown into an internationally recognised area of nursing practice with annual conferences and regional alliances.

There is an increasing demand worldwide from governments, employers and the community for accountability and multi-skilling of health professionals to achieve improved health outcomes (Sullivan, 1994). Partly in response to this there has been significant growth in postgraduate certificates in diabetes education. Certification of diabetes educators in the United States of America has occurred for many years to ensure that educators have demonstrated minimum knowledge and proficiency regarding diabetes care.

In Australia, the accredited national curriculum for diabetes educators covers knowledge of diabetes, management of diabetes and a minimum of 40 hours of educational theory and 40 hours to observe a credentialed diabetes educator’s practice. However, being a Credentialed Diabetes Educator or having completed an accredited course is only a ‘desirable’ not ‘essential’ criterion for employment as a diabetes educator. Thus, not all diabetes educators will have studied education theory in preparation for the role.

The role of the diabetes educator is further supported by many national documents which have been developed to guide diabetes educators’ practice. They include, but are not limited to, the *National Core Competencies for Diabetes Educators* (1996), *Outcomes and Indicators for Diabetes Education: A National Consensus Position* (2007) and the *National Evidence Based Guideline for Patient Education in Type 2 Diabetes* (Colagiuri et al., 2009).

These documents identify a wide range of research about diabetes education and have provided some beginning understandings about diabetes education. However, there is recurring commentary in the research identifying the absence of details about education interventions (Padgett, 1988; Dunn, 1990; Brown, 1990; Cradock, 1998; Eigenmann & Colagiuri, 2007). In addition to this there is very little information about what diabetes educators do that is considered teaching.

This led me to explore the diabetes education research literature to look for examples of research on effective teaching and learning within diabetes education.

Diabetes Education Research

The research literature in diabetes education has focussed on education which achieves the desirable goal of normal blood glucose levels or normoglycaemia. The focus has ranged from knowledge acquisition (Dunn et al., 1984) and retention (Speight & Bradley, 2001) to behaviour modification (DPPRG, 2006), empowerment (Funnell, 2004), motivational interviewing (Miller & Rollnick, 1991, 2002), quality of life (Bradley et al., 1999) and self-management (Norris, 2002; Funnell & Anderson, 2004; Lorig et al., 2001). All of the studies have been able to show some improvements in diabetes management but none have been sustainable. Thus the rates of complications and hospitalisations continue to rise.

In the 1980s there was a boom in research into the education and psychosocial aspects of diabetes care as evidenced by an increase from 80 to 200 related publications cited in Index Medicus between 1980 and 1987 (Dunn, 1990). Throughout this time it was noted that patient knowledge of diabetes and its management was inadequate according to the standards established by the American Diabetes Association and the American Association of Diabetes Educators (Teza et al.,1988, cited in Dunn, 1990). The developers of these standards believed that

> Patient knowledge of self-management principles reduces the consequences of diabetes, including both the long-term complications and the considerable financial costs for both patients and society.
> (Brown, 1990, pp. 189-190)

However, some studies (Surwit et al., 1982; Hulka et al., 1975; Watkins et al., 1967) have shown that people with diabetes do not manage their therapy accurately, even after receiving instruction (Brown, 1990, p. 190). Watts (1979, p. 171) presented a narrative review of the literature on factors relevant to knowledge, self-care and metabolic control in diabetes patients and concluded that “traditional education programs have little clinical value beyond improving knowledge about diabetes” (Brown, 1990, p. 190).

This ongoing question about the value of patient education in diabetes care in the literature was somewhat resolved by Brown (1988, 1990) in her meta-analysis of educational interventions and outcomes in diabetic adults. Brown’s (1990) findings in her second meta-analysis were consistent with those in her first review in 1988 and lent support to effectiveness of diabetes patient education in improving patient outcomes, specifically their knowledge and blood glucose levels.

However, both Brown (1988) and Padgett (1988) agreed that whilst the overall effect size was moderate (+ 0.51), indicating that those receiving an intervention were better off than members of control groups, the limitations of the 82 studies were wide ranging. Limitations of the studies reviewed included inadequate description of the study design, sample characteristics and intervention content; neglect of cost-related outcomes; poor theory-base; and poor assessment of behaviour change (Dunn, 1990, p. 283; Brown, 1990, p. 194).

Brown (1990) identified that the only significant relationship found in the literature was “the older the mean age of the subjects, the lower the effects, particularly those related to knowledge variables” (p. 96). Also of note, was that “diabetes education was not very effective in helping patients learn [the skill of] insulin injection” (Brown, 1990, p. 196).

Throughout the studies reviewed by Brown (1990) the inability to improve diabetic control through interventions involving new technologies was frequently attributed to human failure rather than to the failure of the therapeutic approach to respond to human needs (Brown, 1990, p. 283).

The failures were attributed to human failures or as suggested, to a therapeutic approach not responsive to human needs. In addition to these two possible reasons for failure to achieve glucose control the role or process of the education as an intervention also needs to be considered.

Also, there was a notable absence of discussion about educational theory within the studies.

> If educational or psychological theory is guiding the development of interventions this is not evident from this survey, which found few studies describing clearly mechanisms by which the intervention might affect outcomes. (Cradock, 1998, p. iii)

This attribution of human failure and the inability of therapeutic approaches to respond to human needs as the cause of poor diabetic control gave rise to a new direction of research in the late 1980s and early 1990s.

In the late 1980s many authors, according to Dunn (1990), believed that diabetes care and education had entered a new era focused on behaviour and lifestyle change. This was later evident with an upsurge in studies revolving around behaviour modification and behaviour change techniques such as transtheoretical therapy by Prochaska et al (1994), language and literacy issues (Gohdes, 1996), motivational interviewing techniques described by Miller and Rollnick (1991), and power relationships and empowerment (Anderson, 1995; Funnell, 2000), with no significant long-term improvement in the persons diabetes knowledge, management skills or blood glucose control. Each of these techniques produced some short-term improvements and thus appealed to many diabetes educators.

Following this emphasis on behaviour change the notion of improving a person's quality of life became the key focus for diabetes education. This came about partly as a result of the recognition that long-term behaviour change was rarely achievable if the person's quality of life was significantly reduced. It was thought that perhaps adherence to tight therapeutic regimes, whilst important, was better achieved in a more balanced approach to the person's overall lifestyle.

Quality of life refers to the individual's experience of their own life situation commonly related to the following life domains: (a) physical status and functional abilities, (b) psychological status and well-being, and (c) social interactions (Hanestad & Albrektsen, 1992). Measurement of quality of life became increasingly recognised as an important outcome in clinical research in contrast to the more traditional biomedical measures (Spilker, 1990).

Many different definitions of quality of life exist (Goodinson & Singleton, 1989) with a variety of research instruments being used to measure this outcome (Wenger, 1992; Patrick & Deyo, 1989). This has made comparison of results and generalisation about those results difficult.

The philosophy of valuing quality of life continues today but is influenced by the findings of the Diabetes Control and Complications Trial (DCCT Research Group, 1993) and the United Kingdom Prospective Diabetes Study (UK Prospective Diabetes Study Group, 1998) which showed that good glycaemic control reduced complications of diabetes by up to 60% for people with type 1 and type 2 diabetes respectively. So, once again the emphasis has returned to the need for constant glycaemic control, which affects well-being and quality of life, and consideration of how best to achieve that aim.

Any discussion about quality of life as a measurement of glycaemic control would of course need to consider the differences between generic quality of life, health related quality of life, and diabetes related quality of life. In 1995, Colagiuri, Colagiuri, and Naidu postulated that the health outcomes of people with diabetes could be significantly improved if all people with diabetes have access to

- opportunities for self-care education and skills training;
- routine monitoring of clinical status to promote optimal diabetes control; and
- regular screening to facilitate the early detection and appropriate management of complications.

These suggestions to improve diabetes outcomes have been incorporated into contemporary management guidelines and are showing increases in early detection of both diabetes and complications. There is little evidence of improved glucose control and self-management.

In addition to these major studies, other researchers (Miller & Goldstein, 1978; Edmonds 1987; Malone et al., 1989; Assal, 1991; Redhead et al., 1993; Verlato et al., 1996) have found that, either alone or in combination, patient education can improve metabolic control, reduce the number and duration of hospital admissions for amputations, and reduce mortality. However, within these studies, descriptions of the interventions were limited to using intensive education sessions, follow-up and close monitoring. There are no descriptions of what constituted the teaching and learning interaction.

All of the studies reviewed by Brown (1990) identified the significance of good glycaemic control and suggest that education is important in achieving this. However, the studies don’t provide details of how to help patients construct knowledge that will achieve glycaemic control.

Many studies have reported useful strategies, but have provided little description or detail about the nature of the interventions (Brown, 1990, p. 194). Thus a major deficit in the literature is information about how well prepared diabetes educators are to deliver diabetes education and how to implement an effective education program.

> Education may be delivered in an individual basis, through ‘one-off’ group education programs, or by means of supported groups which are conducted on an ongoing basis. Of these, individual education remains by far the most common method. Improvements in patient knowledge, confidence and adherence to self care recommendations have been widely reported as a result of group education (Padgett et al, 1988; Brown, 1990) and, although less frequently studied, individual education (Colagiuri, R et al., 1994). (Colagiuri, Colagiuri, & Ward, 1998, p. 26)

As evident above the most significant literature in diabetes education research last century was a meta-analysis by Sharon Brown in 1988, which she repeated and extended in 1990 following criticisms of the meta-analysis technique used. In 1998, the systematic review by Cradock for the British Diabetic Society identified similar limitations in the research to Brown’s review in 1990.

The need for better designed studies was also supported by Cradock (1998) in her review of the educational and psychosocial interventions for adults with diabetes on behalf of the British Diabetic Association, Education Advisory Committee and stated as follows: “There is considerable agreement that educational programmes are beneficial for patients across a range of outcomes, but interpretation is difficult because of methodological weakness” (p. i).

Whilst the research designs might be weak what is of most interest is the design of the education intervention but the details are not provided. Cradock (1998) supported the continuation of education programmes despite the research limitations and noted specific areas of benefit and differences between hospital and community programs.

> Interventions aimed at improving patient-provider communication appeared to improve emotional and physiological outcomes in the short term. Programmes in hospital settings showed larger effects on knowledge and metabolic control; and in the community on weight loss and skill performance. (Cradock, 1998, piii)

In 1999, the American Association of Diabetes Educators (AADE) held the Diabetes Educational and Behavioural Research Summit in Chicago. The aim of the summit was to “establish the present state of diabetes education research” (Nettles, 1999, p. 1). The goals of the meeting included critiquing published diabetes educational and behavioural research literature, identifying results that could be translated into practice and identifying areas and questions to be researched.

As Nettles (1999) stated so eloquently, “many are beginning to realize that the plethora of drugs, devices, and treatments are useful only if people with diabetes know how to use them most effectively” (p. 3).

> What is the best teaching method? What is the best way to incorporate counselling skills into traditional clinical care to ensure an efficient patient-centred approach? What should training programs for health care professionals include? (Cradock, 1998, p. i)

At the AADE summit, there were a number of diabetes educational and behavioural research priorities identified. The research priorities were categorised and the points relevant to this thesis are listed in the table below (Nettles, 1999, p. 4).

Table 2.2. AADE summit research priorities

Category	Description	Further discussion and recommendations
Learner characteristics	Conduct more highly powered studies to identify specific effective interventions for subgroups of learners. Gain a better understanding of behavioural assessment versus interventions and what types of data are needed for what outcomes. Create links between clinicians and investigators to study specific communities or populations.	
Interventions/ methods and theory	Learn the best teaching methods.	Borrow theory and methods from non-diabetes-related literature
Provider effects	Learn more about who is providing diabetes education and counselling, and what provider characteristics are most important for successful patient outcomes. Gain a better understanding of the relationship between care and education with regard to the effect of the provider.	Determine the impact of systems of care and provider communication on patients/outcomes
Behaviour change	Learn which program strategies produce a change in psychosocial factors that result in behaviour change (eg: teaching, contracting, goal setting, curriculum).	Identify and study specific behaviours outside of the diabetes literature
Educational and behavioural outcomes	Study community-based and health-system-based educational models. Borrow appropriate outcomes from other chronic disease management models believed to be effective.	Study intent to change, coping, patient/provider interaction

Note. From Nettles (1999, p. 4)

As is clearly identified by the broad list of research areas and questions, diabetes education is a developing field, grappling with the desire to improve the quality of education provided and reduce the incidence of complications among people with diabetes. However, there is no known published research on teaching and learning in diabetes education.

Professional Literature on Diabetes Education

In keeping with international thinking and also at the turn of the century Diabetes Australia commissioned the development of evidence-based guidelines for diabetes management. These guidelines have provided important understandings about the diagnosis of diabetes, its incidence and prevalence and best practice guidelines for management. In the process of developing guidelines for education, a series of other national documents were developed.

The *National Standards for Diabetes Education Programs* was developed in 2005 and whilst it outlines the content to be covered, like most curriculums it does not detail how the content could be taught, the time required, or how to determine the sequence of the content for the individual with diabetes. Potentially, the list of topics to be covered could be used as a checklist with little individualisation or checking for understanding, particularly by the inexperienced educator.

Interestingly there are few explicit definitions of diabetes education available, so it is not surprising that diabetes programs differ greatly in their design and implementation. The 2004 publication, *Information and Education for People with Diabetes: A 'Best Practice' Framework* (Colagiuri & Goodall, 2004) provided a start to defining diabetes education, but as a framework was not considered explicit enough for diabetes educators to implement. In the *Outcomes and Indicators for Diabetes Education* (Eigenmann & Colagiuri, 2007) national consensus document the following definition was used for the purposes of the project.

> Diabetes education is an interactive process that facilitates and supports the individual and/or their families, carers or significant social contacts to acquire and apply the knowledge; confidence; and practical, problem-solving and coping skills needed to manage their life with diabetes to achieve the best possible outcomes within their own unique circumstances. (Eigenmann & Colagiuri, 2007, p. 39)

This definition is useful in identifying that diabetes education is interactive and needs to help the person manage their life with diabetes. However, it does not help in the understanding of how the diabetes educator can help the individual acquire what they need to self-manage in terms of teaching and learning. There is also little information about how the learner (the patient with diabetes) is to be an active participant in their learning.

In 2004 the ‘Best Practice Framework for Information and Education for People with Diabetes’ (Colagiuri & Goodall, 2004) was developed and then closely followed by the National Outcomes and Indicators for Diabetes Education in 2007 for Diabetes Australia. Whilst this latter document was designed for use by diabetes educators and diabetes education centres it has not been a formal requirement for funding and has had limited uptake.

In this document the three main goals of diabetes patient education were identified as:

- Optimal adjustment to living with diabetes
- Optimal health (physical) outcomes
- Optimal cost effectiveness (for the individual and for society).

In addition to these goals, the following agreed key outcomes were identified as being directly attributable to the first goal:

- Knowledge and understanding (includes application of knowledge)
- Self-determination (includes confidence and capacity for decision making)
- Self-management (includes skills, practices and behaviours)
- Psychological adjustment (includes well-being and quality of life).
  (Eigenmann & Colagiuri, 2007, p. 41)

The original aim was for all Australian diabetes centres to report on these goals with a view to developing a national database about diabetes education programs and their effectiveness. This would have been a useful database for diabetes educators to source effective teaching programs. However, there was no agreement on which testing instruments are suitable for use to measure the outcomes or indicators. “Further work needs to be done to reach agreement on nationally standardised data collection tools and the development of a core minimum knowledge questionnaire which could be applied nationally” (Eigenmann & Colagiuri, 2007, p. 49).

The indicators identified for each of the four key outcomes do not seek information about the teaching and learning occurring in the diabetes education programs. An example of this is the key outcome of ‘self-management’ which refers to the person’s ability to know about their diabetes management rather than what is required if their diabetes management is not working which is of major practical significance for the patient, the educator and the health system.

The following is an extract from the Outcomes and Indicators document which could be used to evaluate a person’s ability to self-manage their diabetes. Again, it identifies the outcomes the diabetes educator will use to measure the self-management achievements of a person with diabetes but it does not provide any guidance for the process of teaching and learning to be used by the diabetes educator to achieve the outcomes.

> Self-management/self-care practices/behaviour change as measured by scores (threshold value) on a given test instrument for:
>
> - practical skills (ie. SBGM, insulin injections, foot care)
> - medication taking
> - physical activity
> - appropriate eating
> - risk reduction (smoking, alcohol intake)
> - appropriate attendance rate for medical care
> - carrying diabetes identification
> - hypoglycaemia management
> - sick day management
> - hospital admissions (for DKA, Hyperosmolar hyperglycaemic nonketotic coma (HHNC)).
>
> (Eigenmann & Colagiuri, 2007, p. 43)

Whilst the list of desirable self-management outcomes could potentially be learned from friends, family or the internet. It is now common place for people with chronic health issues such as diabetes to be independently informed and encouraged to access relevant services and online information. The access to information and services has significantly improved for many Australians since diabetes became a national health priority in early 1996. However, information and access to services provides only superficial knowledge and understanding about diabetes management and is insufficient for individuals to self-manage their condition.

In the research literature on teaching and learning, understandings of self management of learning are related to the cognitive, metacognitive, and motivational influences on problem solving and self-regulated learning (Mayer, 1998; Paris & Ayres, 1994; Lawson & Askell-Williams, 2001). However, in health care self-management means you are responsible for your own care and predominantly manage your condition independently.

Self-Management

The idea that the patient needs to learn how to manage their diabetes independently needs to be made clear to people with diabetes and they need to be encouraged to become active learners. This is particularly important for the person with diabetes as there is no defined clinical or educational pathway from diagnosis to self-management. The person with diabetes needs to be linked into a diabetes education centre or health professional who informs them of the services, resources and recommended management guidelines for their type of diabetes. This fundamental information would enable the person with diabetes to then actively engage with their diabetes management and the associated process of learning.

This fundamental knowledge for the patient (learner) is important if they are to become self-regulated learners and self-managers of their diabetes. If the patient believes they will be told all they need to know to self-manage their diabetes by the educator, doctor, podiatrist or dietitian then they may not be successful in optimal management of their diabetes. They will also need problem solving skills to utilise this knowledge in new and unique ways as they encounter changes in their daily life.

In the past, the health care system was hospital based and disease-focussed rather than the current contemporary shift towards a primary health care system for chronic disease management with a focus on prevention and self-management. This shift in health care has brought with it a change in how chronic disease is managed and a change in the responsibilities and expectations placed upon the person with the chronic disease. In particular, there is a move from a one-way transmission model of education where the person goes home and follows doctors' orders to a more interactive learner directed model of teaching and learning for independent self-management. “Over the last decade or two the focus of diabetes education has shifted from a doctor/nurse didactic information-giving style of education to a more patient-centred approach” (Eigenmann & Colagiuri, 2007, p. 11).

It is only in recent times that this recognition of change in education style has led to discussions about self-management as a focus of education in chronic diseases such as diabetes.

Self-management is critical if the health system is going to be able to address the costly problem of complications. Self-management of diabetes is seen as one of the aims of diabetes education but how can the diabetes educator help the patient to develop knowledge that will enable the patient to be self-managing. The fact that an examination of the professional literature fails to find detailed information on teaching and learning stands beside a well-established body of research on these topics that is available in the field of general education. There is however, too little explicit recognition of the outcomes of this general educational research in the professional literature of diabetes education. There have been movements that have focussed on behaviour change, motivation theory and quality of life but there has not been detailed explicit attention to teaching and learning processes and strategies. This is arguably a major point of weakness for diabetes education.

There is detailed knowledge of how diabetes can be managed to reduce complications but there is not a well-developed body of knowledge about how diabetes educators and patients can construct such knowledge in a way that will enable effective self-management. In particular, we do not have detailed knowledge about whether diabetes educators and patients have understandings about teaching and learning that makes likely the construction of knowledge that will support effective self-management of diabetes. Investigation of these understandings is the explicit focus of this thesis.

In 2009, the authors involved in the development of *Outcomes and Indicators for Diabetes Education—A National Consensus Position* (Eigenmann & Colagiuri, 2007) and others developed the *National Evidence Based Guideline for Patient Education in Type 2 Diabetes* (Colagiuri et al., 2009). The gap in the understandings about teaching and learning and the absence of the broader education literature was again evident. Also, in the systematic review for the national guidelines the authors re-stated the difficulties of assessing the effectiveness of diabetes education programs given the limited details provided in many studies about the education interventions.

> Demonstrating comparative advantages of different education models, delivery modes, and settings is problematic due to inadequate description of interventions (Corabian & Harstall, 2001). This precludes reliable conclusions to which type of program or what components are most effective and lack of agreed goals and indicators (Muhlhauser & Berger, 2000; Eigenmann & Colagiuri, 2007). Evaluation is further complicated by factors such as the competence of the health care staff (Colagiuri et al, 1994) and it has, therefore, been difficult to determine the impact of educational interventions (Peeples et al, 2001).
>
> (Colagiuri et al., 2009, p. 69)

Determining the impact or effectiveness of educational interventions has been problematic as much of the research focused on the outcomes such as improved glycaemia rather than the learning and understanding of how to use the new knowledge in a variety of contexts of daily living. The lack of detailed information about what happens in a diabetes education session is of interest as we try to understand effective strategies which enable people with diabetes to develop and use their knowledge and skills to effectively manage their diabetes.

What we do know about diabetes education sessions is that they are provided in many different ways which does make it difficult to compare the diabetes education intervention used. Examples of differences include:

- delivery—1:1 or in a group;
- program design—led by the health professional, patient, peer, issue or topic;
- strategy—goal setting, demonstration, discussion, videos or handouts;
- techniques—question and answer, ‘what if scenarios’, phone follow-up; and
- context—GP practice, community health centre, hospital, DE centre.

These many variations make researching *best practice* very difficult.

It is now widely accepted that to enable people with diabetes to care for themselves independently on a daily basis, education and skills training are key elements in successful management, perhaps even as important as insulin according to Jerviell (Colagiuri, Colagiuri, & Ward, 1998, p. 26; Assal, 1991; Jerviell, 1996). Recognition of the need for more focus on self-management has led to an increase in literature around strategies for effective self-management.

However, the descriptions of self-management in diabetes care are not the same as the descriptions of self-management in teaching and learning. In education theories and research, self-management refers to self-directed or self-regulated learning at a cognitive level, not activities undertaken by the learner (patient) by themselves to manage the disease such as injections, monitoring and exercising. There is a well-developed literature on teaching and learning but for the most part this is not used in designing or discussing diabetes education programs.

So let us look at how the diabetes education literature conceptualises effective education.

Education and the Diabetes Education Literature

Given that there is a fundamental belief that education is important in diabetes management (Colagiuri, Colagiuri, & Ward, 1998, p. 26) it is important to look closely at what it is that occurs in a diabetes education session and specifically at:

- what it is the teacher (CDE) and learner (patient) believe are their roles in this education process,
- what their understandings of teaching and learning are, and
- how they know when learning has occurred.

In 2009, the national evidence based guidelines for patient education in type 2 diabetes were released. It was anticipated that these guidelines would provide information for diabetes educators to guide their education practice. However, the opportunity to achieve this outcome was limited by the exclusion of most educational theory literature except for the recognition of learners as active participants.

> According to a technical report published by Diabetes Australia (Colagiuri & Goodall 2004), there is a vast body of literature relating to education theory but no general agreement on how learning takes place. From their literature review of education theory, the authors conclude that while there is no one theory which can be used for all people in all situations, there is general agreement that the learner must be an active participant in the learning process and that there must be a variety of learning experiences for optimal learning to occur. (Colagiuri et al., 2009, p. 7)

In addition to excluding most educational literature, the guidelines were further limited by the narrow remit of evidence from within the diabetes education and intervention research literature.

> This guideline sets out the best available evidence, from systematic reviews (SRs) and randomised controlled trials (RCTs), about what has been shown to be effective in diabetes patient education. It should be noted that the remit for this guideline was to identify and synthesise the evidence for educational interventions in people with type 2 diabetes. (Colagiuri et al., 2009, p. 9)

However, the guidelines did provide the following recommendations and practice points for diabetes educators to use in their practice and for researchers to use as a benchmark of the current evidence in diabetes education.

The *National Evidenced Based Guideline for Patient Education in Type 2 Diabetes* recommends:

> 1. All people with type 2 diabetes should be referred for structured diabetes patient education (Grade A)
> 2. Diabetes education should be delivered in groups or individually (Grade A)
> 3. Efforts to improve the cost-effectiveness of diabetes care should include patient education (Grade B)
> 4. Diabetes education should be culturally sensitive and tailored to the needs of socio-economically disadvantaged populations (Grade B)
>
> (Colagiuri et al., 2009, p. 6)

These recommendations are followed up with the following four practice points which were developed from the evidence and include experts' consensus in absence of gradable evidence.

> - Diabetes education, where possible, should be delivered by a multidisciplinary team.
> - Education programs should be comprehensive and should include a component on physical activity
> - People with diabetes should be encouraged to actively participate in goal setting and decision making
> - Educational interventions should be followed by regular reinforcement
>
> (Colagiuri et al., 2009, p. 6)

The national evidence based guidelines and practice points confirm broad understandings about effective diabetes education. They are, however, not sufficiently detailed about the processes of teaching and learning to guide the current practice of diabetes educators. For example, the first recommendation does not define what is meant by “structured” education. This could simply mean the education program has a list of topics to be covered with no direction of how to do this. At the other extreme it could mean that all people with diabetes will be given the same program irrespective of its relevance to them and their learning needs. The last practice point identifies the idea of “regular reinforcement” which is well understood in education literature has having a positive benefit for learning. However, there is little information about the frequency of the reinforcement, maximum time between the reinforcement opportunities or how the reinforcement should be undertaken. The absence of detailed information for use by diabetes educators means the guidelines provide very little direction for the diabetes educator about best practice for designing education sessions and support for patients outside those sessions.

Having considered what currently occurs in a *typical* diabetes education session and acknowledging that the desired outcomes of education are not being achieved, it is necessary to look at the education process in detail. The diabetes education process has, since its evolution in the 1970s here in Australia, focused on the provision of information. This approach assumes that the person with the diabetes (the learner) is keen to learn, capable of learning, able to carry out the activities taught and will continue to do so, will recognise any problems or changes and will seek further assistance if any problem or change occurs.

There is research that goes some way to supporting each of the determinants of effective diabetes education as described by the *Outcomes and Indicators for Diabetes Education—A National Consensus Position* (2007). For example, effective diabetes education is education that:

1. Meets the goals of management

Blood glucose levels or HbA1C within normal range can be achieved with intensive diabetes management, regular follow up and frequent interactions with the health care team (DCCT Research Group, 1993; UKPDS Group, 1998). This intensive education and management would require a significant increase in funding and human resources. This is not sustainable so people with diabetes need to learn how to intensively self-manage.

2. Creates behaviour or lifestyle change

The changes need to be long lasting and sustainable. Prochaska's change model underpins the more contemporary transtheoretical model (Glanz, 2002) which identifies the various stages of change that individuals move through in order to adopt and maintain a behaviour. The transtheoretical model also identifies important concepts such as decisional balance (the benefits versus the costs of changing) and self-efficacy (confidence that one can engage in healthy behaviours across a range of challenging situations versus temptation to engage in unhealthy behaviours) which impact on the models effectiveness.

3. Reduces complications or their severity and hospitalisations

The Health Belief Model (Glanz, 2002) identifies that the likelihood of a person adopting a new behaviour depends on how they perceive the benefits as opposed to the barriers (or costs). The adoption of the new behaviour (e.g., engage in self-care practices) will be dependent upon a person believing they are at risk of an adverse event (e.g., diabetes complications), that the consequences of the event are severe and that the event can be avoided by engaging in the new behaviour. This belief needs to be supported by education and understanding that is individualised.

4. Enables quality of life

The quality of life, psychological and well-being literature is extensive and identifies that the balance between effort to achieve goals and the interference with an enjoyable life is critical to individuals desire to change lifestyle practices and take up new behaviours. Education about how good health positively impacts on quality of life is important for people with diabetes to change long term lifestyle practices.

5. Encourages self-management

In the diabetes literature this concept is about increased knowledge and understanding about diabetes and management as it applies to the person with diabetes. It is not about self-regulation and metacognition as the term is used in the education literature. However, short term knowledge acquisition is all that has been demonstrated in diabetes research with very little evidence of problem solving or self-management skills. There is now an international movement towards diabetes self-management education (DSME) through the American Association of Diabetes Educators (AADE) and the Australian Diabetes Educators Association (ADEA) which aims to make the person with diabetes an active member of their diabetes team and to improve health status by empowering the person with diabetes to:

> - Acquire knowledge (*what to do*)
> - Acquire skills (*how to do it*)
> - Develop confidence and motivation to perform the appropriate self-care behaviours (*want to do it*)
> - Develop the problem-solving and coping skills to overcome any barriers to self-care (*can do it*).
>
> (Mulcahy et al., 2003, p. 774)

The two internationally recognised models of self-management education used in diabetes and other chronic disease self-management education programs are the Stanford University Model (Lorig et al. 1996, 1999, 2001) and the Flinders University program (Battersby, et al., 2001, 2003, 2008, 2009; Harvey, et al., 2008). “The Stanford Model focuses on peer leadership and generic skill development” (Visentin & Giles, 2013, p. 5) and

> is underpinned by self-efficacy theory which is premised on the:
>
> - belief in one’s ability to perform a task is a good predictor of motivation and behaviour;
> - self-efficacy can be enhanced through skills mastery, goal attainment, modelling and social persuasion;
> - improved self-efficacy leads to improved behaviour, motivation, thinking patterns and emotional wellbeing. (Visentin & Giles, 2013, p. 5)

The Flinders Chronic Condition Management Program (formerly model) is clinician led and is designed to be integrated with medical management. It also identifies the Transtheoretical Model as a useful model to guide health professional interventions which should be characterised by:

- collaborative goal definition;
- targeting, goal setting and planning;
- training and support for individuals to change;
- active and sustained follow-up.

The Transtheoretical Model (Prochaska & DiClemente, 1983; Prochaska, DiClemente, & Norcross, 1992) is a process of intentional behavior change which seeks to include key constructs into a comprehensive theory of change hence, the name Transtheoretical.

6. Empowers people with diabetes

There is extensive literature predominantly by Anderson and Funnell (1991, 2005, 2010) about the importance of the person with diabetes having choice in their diabetes management and not just doing what the diabetes educator tells them to do. However, true empowerment includes the person knowing when to seek help.

7. Inclusive for cultures, families, belief systems

The literature in diabetes education for different cultural groups and belief systems is very limited. The focus in this literature is on the diabetes management and how it is affected by language, food, fasting and high environmental temperatures. Whilst these differences are acknowledged there is little or no literature to describe effective teaching and learning strategies. An example of this would be the adjustments made to diabetes management to meet belief systems such as fasting during Ramadan (Peterson, et al., 2011).

In summary, these outcomes and indicators and the related diabetes literature go part of the way to instructing diabetes educators about how to provide effective diabetes education. However, they could go further. Effective diabetes management could also be supported by education that builds powerful knowledge. Bruner (1966) used the term Powerful Knowledge to indicate that effective learning gave the learner more capacity to handle problems. This powerful knowledge would enable the person to self-manage, to solve problems and to know when to seek help.

Most diabetes education research has focused on what information is given, how it is given and the retention of the information provided. Almost no research has investigated the process of learning which occurs during this information provision, nor has it reflected the related teaching approaches associated with the information processing of the learner. Importantly there is no diabetes research which has considered the understandings held by the patient and the educator nor the perspectives that influence how each person prepares and conducts themselves during and after the education sessions.

So, while the literature identifies different ways to conduct an education session, and acknowledges some of the benefits gained from these sessions, there is little information about the detailed teaching and learning skills and strategies that can be effective for both the diabetes educator and the patient. Therefore, a diabetes educator reading these studies would have difficulty getting a deep understanding of what was effective about the teaching and learning interaction.

The literature says that education can be effective to reduce hospitalisations and complications. But the health statistics tell us diabetes related hospitalisations and complications continue to rise, suggesting diabetes education could be better. Also, the diabetes education literature does not provide detailed, theory-based accounts of the educational process of teaching and learning for diabetes educators to use in their practice. This too could be better.

What the educator does in this 1:1 interaction is important to understand to effect change in diabetes education and enable diabetes educators to consistently provide effective diabetes education.

It is the premise of this research that if people with diabetes are to self-manage their condition and prevent complications and hospitalisations then diabetes educators need to assist them to construct the necessary knowledge and understanding to self-manage their diabetes. There is no diabetes education literature which addresses this issue and explores diabetes education as a teaching and learning event.

To begin the investigation in this component of diabetes education this thesis provides accounts of current diabetes education practice and analyses them using contemporary educational theory about teaching and learning. The role of the diabetes educator and the patient in the education session is described from each of their perspectives and their understandings analysed.

So let us look at how the education literature conceptualises effective education and how it might be useful in diabetes education.

Teaching and learning

Diabetes Education as a Teaching and Learning Event

It is clear that the diabetes educator and the person with diabetes are involved in a teaching and learning event. The patient comes along to find out how to manage this newly diagnosed disease, a disease which is quite serious and might be creating some anxiety in the patient. The diabetes educator has some important knowledge that he/she must help the patient to construct so that after these sessions the patient will be able to manage their diabetes effectively.

So this is an educational event involving teaching and learning. One party is intending to help the other party construct a network of knowledge that will support subsequent self-management and problem solving. How each understands this event is of interest because of the potential impact their conceptions of teaching and learning and their role expectations have on the outcome of the learning. For the person with diabetes and the health system it is a high stakes event.

In a teaching and learning event there is usually a teacher and a learner, and a context in which the teaching-learning interaction occurs. The exceptions here are the instances of self-education where a person maybe both the teacher and learner or the teacher is not present in the case of self-directed study materials. However, there is always a context and some level of interaction. In each particular context, the teacher does things called teaching and the learner does things called learning. This interaction is what we refer to as the teaching and learning event.

In diabetes education the teacher (diabetes educator) ‘wants’ the learner (person with diabetes) to develop the knowledge, skills and attitudes for effective management of their diabetes. The learner ‘wants’ the same, to a greater or lesser extent. However, as a teaching-learning event, this is a complex situation.

We know that there is more to teaching than the transmission of knowledge but learning is more commonly misunderstood as ‘passive reception’ rather than transmission. As Anderson, Reder, and Simon (1998) note, “A consensus exists within cognitive psychology that people do not record experience passively but interpret new information with the help of prior knowledge and experience“ (p. 232).

Whatever the state of the learner, these interpretive processes will occur and will influence how the information being presented by the teacher or the text is understood. The understanding of the learner taken from an education session might of course be just what the teacher understands and intends . But that understanding might also be incomplete or inaccurate. The teacher does not have complete control over the understanding that the learner constructs.The learner must construct knowledge from the information provided. However, we know that teaching and learning situations are not just cognitive events about knowledge construction. They are also *warm-fuzzy* events in which teachers and learners, with sets of expectations, engage in interaction.

Some learners have high self-efficacy and approach the learning event with expectations that they can master the problems presented to them. Some are not like this (Claxton, 1999) and some learners approach the learning event with expectations that they need to exercise control over the learning, while getting help from the educator. Others have quite different expectations, being less confident in their own capabilities, wanting the teacher to control the learning, and so are heavily dependent on the teacher.

Learning is not necessarily accomplished in a one-off situation between the teacher and learner. The teaching-learning situation is a complex process of interactions and exchanges.

A teaching-learning exchange is:

- contextual;
- an affective, emotional event;
- involves motivational expectations about the situation, self and others;
- involves the use of prior knowledge;
- involves emphasis being placed on certain information by teacher and learner as they independently interpret information and actions; and
- a transformation of this information using cognitive and metacognitive strategies.

In 1981, Kerr published a description of a teaching interaction that emphasised that teaching is a systematic and intentional activity. Kerr (1981) identified that education has a teacher, a learner and a subject matter and that the teacher and the learner have intentions, actions and plans for the education exchange. Lawson (1992) further developed this model and argued that both the teacher and the learner are active participants in this learning interaction and each arrives with intentions and plans.

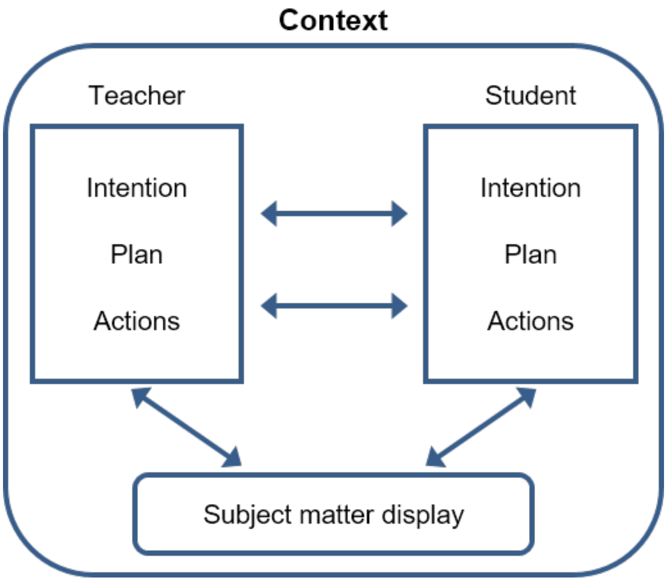


Figure 2.1. Elements of the instructional interaction

Since this time, Lawson (2000) and Askell-Williams (2001) have further developed this model with an increased focus on the teacher and the learners' conceptions of teaching and learning, and their roles in this exchange.

In diabetes education there is an educator, a learner, a subject and a context. The subject is diabetes (or a specific sub topic) and the educator and learner each bring with them a set of intentions (expectations). These intentions are influenced by their understandings about their role and the role of the other person in this teaching and learning event. These intentions influence their plans for the education session and subsequently their actions in the exchange during that session. It is these understandings, plans and actions of the educator and the person with diabetes in this exchange which is of interest in this research.

These understandings about teaching, learning and each other's roles are significant factors which impact upon the learner's (patient's) understandings of how to attend to information for use in knowledge construction. They occur within a context which can impact the plans, intentions and actions of both the learner and the teacher.

Context

The context in which teaching and learning occurs is important with much of the previous focus being on the physical environment. For many years teachers have focused on the impact of the size, temperature and layout of the classroom, the design and comfort of chairs and tables, the variety of teaching resources such as black/white boards, video players, overhead projectors and more recently access to computers. In diabetes education these issues remain important in terms of their contribution to the patient comfort and attention for learning and the educator developing rapport with the patient. However, the way in which the patient perceives the context has not been researched.

> This work and that of Meyer et al (1990) suggests that it is the environment as perceived by the student, not necessarily the objective environment, which relates to approach to learning. (Trigwell & Prosser, 1999, p. 264)

The patient perception of the education context is of interest because of its potential to influence the expectations and intentions of the patient and the educator. When patients attend a health service it is reasonable for them to expect to receive health care and advice. However, when attending a health service for initial consultation about diabetes management do the patients perceive the context as involving educational features—learning, studying, homework? Do they expect to be given information which they need to construct in a meaningful way for self-management of their diabetes.

Similarly, the diabetes educator will have understandings of the context in which they work. A registered nurse working in a hospital expects to provide health care for patients. A registered nurse working in the community expects to work with people to improve their health and lifestyle. It is not known if the diabetes educator working in the hospital or the community expects to be a teacher, someone who might help the patient construct an understanding. The patients' and educators' perceptions of context influence their intentions, plans and actions in learning before, during and after the education session and is one focus of this thesis.

Diabetes Educator as Teacher

In diabetes education the teacher is a health professional, usually a Registered Nurse. All teachers bring with them a range of knowledge, skills and attitudes. Inherent within these are their experiences, beliefs, images, role expectations and conceptions of teaching and learning. It has been reported by Korthagen (1993) that “These images, metaphors and beliefs often seem to be established before students begin training as teachers and can be quite resistant to change” (as cited in Entwistle, Skinner, Entwistle, & Orr, 2000, p. 8).

These factors contribute to the formulation of intentions and plans (Kerr, 1981) for a teaching session and when combined together they form what Askell-Williams (2001) calls *understandings* about the education session. “Images are a metaphorical and partly visual way for teachers to conceptualise their work … and can have far-reaching effects on how [their] practice develops” (Entwistle, 2000, p. 8).

The Credentialed Diabetes Educator who is a Registered Nurse brings with them, knowledge of diabetes care as a Registered Nurse, experiences of diabetes education, experiences in patient education and their own learning experiences of diabetes care and education. The CDE also brings knowledge, skills and experiences as a learner and may base much of what they do on their preferred teaching and learning experiences.

The diabetes educator may not be trained or educated in the knowledge and skills of teaching and learning. However, they will have experience with patient education from their past nursing experience. It is most likely that this experience will be with in-hospital patients, needing to understand their treatment, pre- and post-operative care, discharge medication, and their rehabilitation programs.

> Most health professionals believe that they know how to teach. The reality is most of us are only poor to fair patient educators. There are several reasons for this. First, few of us have any formal training in patient education. Lacking this training, we try to emulate the teaching that we have received. The problem with this approach is that most school-type teaching is aimed at passing on knowledge. Patient education is aimed at changing behaviours or health status. Thus the teaching methods are different and must be learned and practiced. (Lorig, 1996, pp. 86–87)

There is an increasing number of CDEs who have undertaken an accredited diabetes educators’ course which includes approximately 40 hours theory and 40 hours practice on teaching and learning. Alternatively, or in addition to this, they may have observed other diabetes educators as part of their self-directed learning or course requirements.

However, there is limited peer review, feedback or research into the teaching, learning and educational outcomes of the diabetes education sessions. There is a need to investigate the understandings of the diabetes educator and the patient about the diabetes educator as a teacher.

This definition of an effective teacher is aligned with the national guidelines in diabetes education where the person with diabetes is central to the care. The shift in focus away from the didactic one-way information transmission model to an active participatory model influences the role of the teacher and what they do (teaching) to assist in the process of learning. The role of the teacher (diabetes educator) and what the teacher does that is called teaching is of interest in this thesis.

Teaching

Teaching is a complex activity. In teaching there is usually some interaction between the teacher, the learner and learning resources such as equipment, audio-visual or written information. Irrespective of the human and material resources available “good teachers are expected to be clear about what they want students to learn and what students should have to do in order to demonstrate that they have learned at the appropriate level” (Biggs, 1996, p. 361).

There is a knowledge base associated with teaching and learning that could be used in diabetes education. However, it has not been used extensively in the national publications, *Outcomes and Indicators for Diabetes Education—A National Consensus Position* (Eigenmann & Colagiuri, 2007) and the *National Evidence Based Guideline for Patient Education in Type 2 Diabetes* (Colagiuri et al., 2009).

In his discussion of the type of supportive teaching environment that will result in a deep understanding Biggs (1996) argues that teachers need to “know and enact ways of getting their students to learn effectively at the desired cognitive level, to be more student-centred in their teaching-learning activities, and more authentic in their assignments” (p. 361).

Teaching and the interactions between the teacher (diabetes educator), the learner (patient) and the learning resources are of interest to diabetes educators concerned about improving the learning outcomes for people with diabetes. In each education session, the stakes are high as the outcome may truly be a case of life and death.

Understandings of the DNE Role

Diabetes educators have varied experiences and educational backgrounds. These factors influence their understandings of their role as a teacher or Diabetes Educator. A diabetes educator may see themselves as the 'expert' or 'font of all knowledge' and understand the role of the teacher to be one who gives information, so that the emphasis is on a teacher-centred view of learning. Another diabetes educator may see themselves more as a guide or coach (Hill & Clark 2008) who facilitates the learner through the complexities of diabetes management.

A more recent emergence of a student-centred perspective has been presented by van Driel (1997). In health care education this perspective is commonly referred to as "patient empowerment" and patient centred care. This approach places a major responsibility for learning on the adult patient or student. One of the main supporters of the 'empowerment' approach in diabetes education has noted that:

> I have found that the more that I listen rather than talk, the more that I ask rather than tell, the more that I help patients to explore solutions to their own problems rather than advise, and the more I resist labeling and categorizing patients, the better I am able to facilitate their learning.
> (Funnell, 2000, p. 70)

However, it does not seem that the understandings of diabetes educators are well represented by a simple teacher-centred/student-centred account. Holmström et al. (2003) mapped 169 health professionals' understandings of diabetes care using a survey to find out if the patient's learning was the focus. Holmström et al. (2003) identified five different understandings:

- the professionals treat the patient,
- the professionals give information,
- the professionals' focus on relation and organisation,
- the professionals seek the patient's agreement, and
- the professionals focus the patient's understanding of the situation.

The first of these understanding is compatible with a role of health provider. The second perspective can be seen to have a more educational focus although it emphasises transmission rather than construction of knowledge. Of the 169 participants only 30 (17.8%) were focussed on the patients' understanding of the situation that might be seen as more student-centred. Holmström et al. (2003)

concluded that health professionals need to improve their focus on the patients' understanding of the situation to support the patients' learning.

> Competence in pedagogy is crucial in caring for the chronically ill. The current results support the notion that the health care professional's understandings of care and of the patient encounteris important to explore and take as a launching pad for CPD courses. (p. 57)

In this thesis, the understandings about teaching and learning of both the CDE and the person with diabetes are examined.

Teaching Knowledge

Understandings about teaching and learning can be influenced by the wide range of models about teaching each with its own strength and potential use in diabetes education. There are personal models focused on enhancing self-esteem such as those by Rogers (1961) and Maslow (1954). Behavioural models based on the theories of Pavlov (1927), Thorndike (1932) and Skinner (1950) continue to have some influence though they have more recently been seen as providing value within a more inclusive, cognitive framework (e.g., Bruning, Schraw, & Norby, 2011, and Mayer, 2008) .

Models of teaching and learning from the field of cognitive psychology have provided significant contributions. In cognitive psychology research, the emphasis is on teaching to

> Engage students in a variety of different activities for constructing a knowledge base in the subject domain … the teacher's goal is to develop students' understanding of a given topic as well as help them to develop into independent and thoughtful problem solvers … Expert teachers know the structure of the knowledge in their disciplines … Expert teachers are sensitive to the aspects of the subject matter that are especially difficult and easy for students to grasp: they know the conceptual barriers that are likely to hnder learning, so they watch for signs of students' misconceptions. In this way, both students' prior knowledge and teachers' knowledge of subject content become critical components of learners' growth.
> (Bransford, Brown, & Cocking, 2000, pp. 239-241)

This view of Bransford et al. (2000) maps easily onto the diabetes education session. The educators have expertise in knowledge about diabetes and about the knowledge that is needed for self-management of the condition. They expect their patients to come to act as independent and thoughtful problem solvers as they monitor their blood glucose levels and general health. To do this the patients do need to construct a knowledge base about diabetes and its management. To do this patients need to access their prior knowledge to make links with the new information being presented in the education session. And it is to be hoped that the DNEs will be sensitive to possible barriers to learning and misconceptions. This latter issue will be of major interest in the thesis.Therefore, *good* or *effective* teaching is founded on, and underpinned by, many different kinds of knowledge (Calderhead, 1996; Entwistle, 2000).

> The extent to which teachers have conscious access to knowledge is, however, far from clear. Some researchers argue that much of this knowledge is implicit or tacit, derived from experience rather than from any conceptual framework. (Entwistle, 2000, p. 8)

This is significant in diabetes education as the diabetes educators often bring with them a history of patient education experience and beliefs about people with diabetes and their ability to change their lifestyle. It is also well documented that despite continuing education programs “teachers generally hold onto certain beliefs as being central to their thinking, reasoning and action” (Entwistle, 2000, p. 9).

The implication here for CDEs is that perhaps they do not have the teaching knowledge or experience from which to derive the explicit knowledge about teaching. What they may require more of is the theoretical perspectives and models of teaching that underpin education practice in school, university and vocational based settings.

There is no literature at this time which examines the knowledge and skills of diabetes educators in relation to teaching and learning. However, education literature has explored the idea of teachers’ knowledge about teaching extensively. In 1981, Kerr built on the theory of action developed by Danto (1973) to analyse teaching as an ‘intentional’ action. In her theory Kerr

> proposed that adequate teaching actions should show that the teacher makes use of the best available knowledge in a number of areas, including knowledge about subject matter, learning, learners, resources and strategies, and the political and moral context. (Lawson et al., 2009, p. 244)

This analysis of teacher’s actions and knowledge was further developed by Shulman (1986a) into a classification system of seven types of teacher knowledge. Shulman’s categories are content knowledge; general pedagogical knowledge; curriculum knowledge; pedagogical content knowledge; knowledge of learners and their characteristics; knowledge of educational contexts; and knowledge of educational ends, purposes and values, and their philosophical and historical grounds (Shulman 1986a, 1986b, 1987; Lawson et al., 2009, p. 245).

A similar system with three categories was developed by Borko and Putnam (1996). The Shulman (1986a) categories were well represented within the three categories of Borko and Putnam which were:

> 1. General pedagogical knowledge, includes knowledge about self and teaching, learners and learning, and classroom management.
> 2. Knowledge and beliefs about subject matter.
> 3. Pedagogical content knowledge and beliefs, which includes epistemological issues related to teaching particular subjects, knowledge of instructional strategies, and knowledge about how to teach such knowledge.
>
> (cited in Lawson et al., 2009, p. 245)

In 1996, Calderhead also developed a classification system with two main divisions for teachers' knowledge and beliefs. The category for teachers' knowledge included subject knowledge, craft knowledge, personal practical knowledge, case knowledge, theoretical knowledge, metaphors and images. In the teacher's belief group he identified beliefs about learners and learning, teaching, the subject, learning to teach, and self and the teaching role as the main categories to be included (Lawson et al., 2009, p. 245). These classifications and groupings are similar to the original seven categories set out by Shulman (1986a).

The complexity of this activity called teaching is indicated by the analyses of the range of knowledge that a teacher needs to use when teaching. To analyse the range of teaching knowledge and beliefs of the diabetes educators I have used Shulman's (1986a) seven categories with the addition of Grossman's (1995) *knowledge of learning* category to analyse the data collected in this thesis.

In this diabetes education *teaching and learning* event the notion of learning and the learner is also of interest as the person with diabetes needs to know how to manage their diabetes.

Patient as Learner

As noted above, the patient brings with them a range of knowledge, skills and experiences about both diabetes and learning. The learner will have understandings about diabetes, learning, teaching, health and health care services (Sircar et al., 2010). In addition to this they bring their fears of diabetes, treatments and complications, along with their grief and loss for a future life and lifestyle (Livingstone et al., 2011). Each of these issues is significant in its ability to enhance or reduce the teaching and learning event.

Patients also have knowledge and expectations about teaching and learning from their schooling, leisure activities and workplace experiences. Some patients will be current students, some will be involved in education in their occupation and others may have a teaching degree. According to Trigwell and Prosser (1999), “students’ perceptions of the teaching and the course can affect their approach to learning” (p. 254). There will be some patients who will know how they like to learn or how they learn best. Other patients will have no understanding of how, when or where they learn best (Fleming et al., 2011).

Of course, patients can also be their own teacher and can utilize a range of information resources to engage in learning. Common resources include the Internet, family or friends with diabetes, books and pamphlets from health care agencies and consumer organisations. Within this approach to learning, as in that where a teacher is present, they can be active or passive learners. They can choose to access information, critically analyse it and actively construct knowledge. Alternatively they can be passive recipients of information where the retention and storage of information is more ‘hit and miss’ and knowledge construction is unlikely to occur in a useful, powerful way. In this instance, the use of information and resources is more for a ‘trial and error’ approach to their diabetes management.

Another issue that can affect a patients’ ability to learn is their orientation toward learning. This can be influenced by their emotional and psychological states of mind, whether or not they have accepted the diagnosis of diabetes and if they are now ready to learn how to manage their condition. Their readiness to learn is also influenced by their understanding of their role in the teaching–learning event.

The person with diabetes will also have a view about their role and learning. They will be interested in such things as (1) who is responsible for the learning and management of their diabetes, (2) how the new knowledge about diabetes and its management can be acquired and retained, and (3) how that knowledge can be used to solve the problems that arise in management of the condition. These views or understandings will influence how and what they learn.

Understandings of Learning

According to Saljo (1979) conceptions of learning are what adults believe learning entails (Entwistle, 1991, p. 201). Conceptions of learning can be described as developmental or as a hierarchy (Säljö, 1979, as cited in Entwistle, 2000, p. 5). It is suggested by Entwistle (2000, p. 6) that the more developed or sophisticated conceptions emerge from a person's early simple conceptions and often retain some elements of them.

In the simplest conception, learning is "the accretion of discrete pieces of information into knowledge" (Entwistle et al., 2000, p. 5). Entwistle et al. (2000, p. 5) goes on to report from Säljö's (1979) work which notes "the most complete conception of learning is focused on learning as the development of personal understanding but with recognition of contrasting types of learning for different purposes".

Säljö (1979) found that there were two distinct perspectives on learners. Those that described learning in absolute terms as a memorising activity designed to "get all the facts into your head". This type was known as the "taken-for-granted" perspective (Säljö, 1979, p. 446). Then there were those who viewed learning as "an object of reflection" (Säljö, 1979, p. 446) such that they then qualified and described in more detailed aspects of learning. Säljö (1979, p. 447) refers to this perspective as thematic. The three main themes identified are:

1. Cue-conscious – becoming aware of the influence of the context of learning on what you should learn and how you should set about learning it.
2. Activity of learning – learning for life versus the routine of learning in school.
3. Real learning – learning for understanding as opposed to rote learning. This involves the abstraction of meaning [cf. Colaizzi, 1973] from learning materials rather than a mere reproduction of them (Säljö, 1979, pp. 448–449).

Säljö in his 1975 study of the relationship between learning conceptions and experiences of learning concluded, “a person’s ideas and beliefs about learning may change as a function of his experiences” (p. 450). This research led to further investigation by Marton and Säljö (1976) into the effect of a person’s awareness of their learning on their ability to deal with different learning situations in everyday life.

Marton and Säljö (1976) initially described two distinct types of learning known

> as deep and surface levels of processing, but later this was amended to approaches to learning (Marton and Säljö 1984) both to avoid confusion with the same term used in relation to memory processes, and to make clearer that ‘approaches’ included not only process, but also intention. (Entwistle, 1991, p. 201)

These two approaches to learning have also been described by Trigwell and Prosser (1999) as the difference between “students attempt to rote learn material in order to subsequently reproduce it” (p. 251), while in a deep approach to learning the student seeks to gain “meaning in order to understand” (p. 251). A deep understanding is desirable in most learning but particularly so in diabetes education.

A deep understanding is multidimensional, it involves several different features, and enables the learner to represent the complexity of the knowledge needed for daily management of diabetes. A deep approach to learning requires quality teaching and can lead to good quality understandings. It is this deep learning for understanding which is the desired outcome of diabetes education.

There is much scholarship of learning with the more contemporary views representing learning as a self-regulated activity involving knowledge transformation and interpretation. However, many of the earlier understandings about learning have relevance for topics within diabetes education.

Learning

Learning is of interest in diabetes education as the person with diabetes is expected to know how to manage their diabetes 24 hours a day, predominantly by themselves. For the person with diabetes and the health system it is high stakes learning.

Learning has been defined in many ways due to a variety of perspectives and theoretical views. Each definition usually has some element of knowledge acquisition and behaviour change within it. For example:

> learning is an enduring change in behaviour, or the capacity to behave in a given fashion, which results from practice or other forms of experience
> (Schunk, 1991, p. 2, cited in Barry & King, 1999, p. 18)

There are several different types of elarning: cognitive, psychomotor and affective are the three commonly recognised categories (Barry & King, 1999). Cognitive learning is essentially concerned with thinking and information processing. Psychomotor learning is generated through physical activity and the development and representation of fine and/or gross motor skills. Affective learning refers to the development of attitudes, beliefs, values and interests in personal and social matters (Barry & King, 1999, p. 19).

Diabetes education involves all of these categories of learning. Essentially, the person with diabetes needs to have

- knowledge about diabetes and its management,
- skills to monitor their blood glucose levels, test their urine, check their feet and administer medications, and
- a positive attitude about their health, lifestyle and long-term management of their diabetes.

There is a body of research on learning which acknowledges these three categories of learning, knowledge, skills and attitudes, and provides insights into the processes and situations which impact learning.

> A scientific understanding of learning includes understanding about learning processes, learning environments, teaching, sociocultural processes, and the many other factors that contribute to learning. Research on all of these topics, both in the field and in laboratories, provides the fundamental knowledge base for understanding and implementing changes in education.
> (Bransford, Brown, & Cocking, 2000, p. 233)

Cognitive psychology theories are useful in describing ways in which people with diabetes can acquire and retain the knowledge and skills needed to manage their diabetes in the long term. Initially there were Behaviourist theories such as the *learning as response strengthening* theories espoused by Thorndike (1965) and further developed by Skinner and Hull (Mayer, 1996, p. 152). These theories gave rise to repetition and drills as core components of any teacher's repertoire of skills. These theories existed alongside strong cognitive views on learning proposed by Piaget and Bruner, both of whom emphasised the role of internal mental, cognitive processes in learning and development.

In the 1960s a major model of learning was the information processing model that was driven by the increasing understanding of computers and the ability to try to replicate how information was processed by the brain in a computer. These models emphasised that learning "is a process of knowledge acquisition in which information is transmitted from the teacher to the learner" (Mayer, 1996, p. 153).

The models such as that developed by Cowan (1988) focussed on how information is processed, stored and recalled by the human brain which is useful in how it helps to develop strategies to maximise teaching and learning via lectures and textbooks. As this field of cognitive psychology developed there was a shift from information processing models of learning to an approach that gave recognition to the active involvement and regulation being exerted by the learner. As Bruner (1983) said, "where before there was a spectator, let there now be a participant" (p. 60).

The notion of the learner as an active and engaged participant who constructs their own meaning is of interest in this thesis.

Lawson (2000) developed a model (COATSRUAM) to categorise the main groups of motivational, cognitive and metacognitive activities occurring in a learning episode. This model is useful in looking at issues that need to be explored in diabetes education to better explain what the person with diabetes may be doing when processing the information provided by the diabetes educator.

The COATSRUAM model developed by Lawson (2000) is a framework designed to outline and simplify the actions involved in learning. The model is useful to identify the major components of learning and to consider their implications for teaching:

- context,
- orientation,
- analysis,
- transformation,
- storage,
- retrieval,

- utilisation,
- attention, and
- management.

It is not a prescription for specific teaching strategies but is significant in its ability to generate ideas about teaching practice (Lawson, 2000, p. 2). This framework has been used in the analysis of the diabetes education sessions and email interviews undertaken in this thesis.

Since the late 1980s educational psychology has moved on to look at learning as the construction of knowledge. This focus includes the earlier recognition of the need for learning to be meaningful and thus research into learning needs to occur in the “world beyond the laboratory” (Neisser, 1976, as cited in Mayer, 1996, p. 153). This focus on real world teaching and learning problems has led to more discipline-specific research such as that into mathematics, science education, reading and writing. “The idea of learning as a process of knowledge construction identifies the teacher as a cognitive guide and the learner as the constructor of the knowledge or sense maker” (Mayer, 1996, p. 154).

This *constructivist* approach has gained momentum as it aids our understanding of the learner’s use of information, the teaching–learning event as an activity in knowledge construction and the factors which impact on the context in which it occurs (Mayer, 1996). Mayer (1998) further developed the constructivist approach through his paper, “Will, Skill and Meta-Skill”.

> When the goal of instruction is the promotion of nonroutine problem solving, students need to possess the relevant skill, metaskill, and will. Metacognition – in the form of metaskill – is central in problem solving because it manages and coordinates the other components.
> (Mayer, 1998, p. 51)

In diabetes education the person with diabetes needs to successfully solve problems that are not always routine. They need to be motivated to learn about diabetes and problem solving for management (*will*). They need to have the knowledge and skills for daily management (*skill*) and finally they need to have the *meta-skills* for successful problem solving. Mayer (1998) describes how each can be influenced by instruction.

Construction of Knowledge

The construction of knowledge is a fundamental aspect of the constructivist theory on teaching and learning. Constructivism has as its focus in learning, the creation of meaning by the learner rather than the transmission of knowledge by the teacher. “Constructivism comprises a family of theories but all have in common the centrality of the learner’s activities in creating meaning” (Biggs, 1996, p. 347).

Whilst there is a family of constructivist theories not all have relevance to education. Phillips (2000) provides a useful discussion of the many constructivist theories for use in education. For ease of understanding he made a distinction between two major groups of constructivist views: those concerned with *social constructivism* and those concerned with *psychological constructivism* (Phillips, 2000). These are broad distinctions but assist in providing useful definitions and understandings about constructivism. Social constructivism

> embodies a thesis about the disciplines or bodies of knowledge that have been built up during the course of human history - that these disciplines (or public bodies of knowledge) are human constructs and that the form that the knowledge has taken in these fields has been determined by such things as politics, ideologies, values, the exertion of power and the preservation of status, religious beliefs and economic self-interest. This thesis denies that the disciplines are objective reflections of an “external world”. (Phillips, 2000, p. 6)

Debates about this definition remain, with probably the strongest arguments between sociologists of science and practicing scientists about the influence of power and ideology on the generation of scientific knowledge (Matthews, 2000, pp. 161–192). However, it is agreed that disciplinary knowledge is a product of human activity and as such can be described as being socially constructed.

The other major view is that of the psychological constructivism. In this view, the act of construction of knowledge is central and the learner actively interprets or transforms what is presented to them in order to make meaning. Phillips (2000, p. 7) summarises the psychological constructivist position as follows:

> Roughly, this … type of constructivist view is that learners actively construct their own (“internal,” some would say) sets of meanings or understandings; knowledge is not a mere copy of the external world, nor is knowledge acquired by passive absorption or by simple transference from one person (a teacher) to another (a learner or knower). In sum, knowledge is made, not acquired.

In this view the learner is systematically interpreting their experiences, what they read, the actions of their teachers (diabetes educators) and their own actions. This systematic interpretation is an act of mental, or cognitive, construction in which the learner, through this process of transformation and interpretation, is building their knowledge about what has been presented to them. The process of transformation is seen an active process in that it is managed by the learner using their current knowledge, attitudes and beliefs. The process of interpretation could be quite conscious and deliberate, or it could be more automatic.

In diabetes education, the aim is to teach the person with diabetes to effectively manage their diabetes at home. To do this the person needs a range of knowledge and skills so they can monitor and manipulate their treatment in order to maintain normal blood glucose levels. Thus, the person needs to construct the knowledge and skills in an accessible way so they can interpret each situation and respond accordingly. This would require learning for meaning and understanding so that it can be used for real life situations. So the question remains, how do we teach people with diabetes in order to achieve this outcome?

In summary, the application of cognitive psychology educational research in diabetes education is that the diabetes educator is seen to be providing the context, the activities and support that will enable the patient to construct good quality knowledge. This is significant for the role of the diabetes educator and their knowledge and skills used for instruction. There is no known research investigating this aspect of the diabetes educator role.

This thesis investigates the conceptions of the diabetes educator in relation to their role, their knowledge of teaching and their understandings about learners and learning.

Quality of Knowledge

Teachers use a complex array of knowledge. In diabetes education it is expected that the knowledge constructed by the patient will be sufficient in quality to enable them to solve a set of common problems, such as adjustments to diet and exercise, maintaining a blood glucose meter and making an informed judgement about whether they should seek further medical advice.

So it is important for us to consider not just what knowledge is held about teaching and learning by diabetes educators but also the quality of that knowledge and whether it is likely to enable the diabetes educator to assist the patient to construct knowledge that will be effective for addressing such problems.

Therefore, in addition to the analysis of teacher knowledge and beliefs, this thesis also examined the quality of the statements made about teaching as a reflection of the quality of the teacher's knowledge. The quality of this knowledge is of interest, as the more explicit and developed it is, the more accessible it is for the educator during an education session and so for the learner.

This issue of teacher quality is particularly relevant in the professions where *content* knowledge is highly valued and expected, yet less importance is placed on the quality of the *teaching and learning* knowledge of the diabetes educator. In 2005, the US Secretary of Education Margaret Spellings reported on teacher quality and she argued that among other things, the focus should be on "the critical teaching skills all teachers must learn" (Spellings, 2005, p. iii, cited in Townsend & Bates, 2007).

There are, however, many strategies and methods of instruction which make up a 'toolkit' for teachers. The toolkit is somewhat limited though by the quality of the teacher's knowledge to know when and how to use each teaching approach. "Of far more value than a collection of 'how tos' will be the ability to study a situation, notice what students need, and invent appropriate practices" (Schoonmaker, 2002, cited in Goodwin, 2010, p. 25).

Goodwin (2010) goes on to say that whilst "teachers need to learn a variety of methods so that they have a repertoire of 'things to do'" (p. 25), they also need to develop "ways of *thinking* about what to do as subject matter knowledge, theories of learning and development, and methods of teaching are all brought to bear" (p. 25).

Quality teaching is complex as is quality learning. If people with diabetes are to learn to self-management then they will need accurate yet complex knowledge about diabetes to enable them to problem solve each situation. The diabetes educators needs to have quality knowledge about how to instruct the person with diabetes to assist them to construct this complex knowledge base for self-management.

In the education literature there is a broad consensus that teacher quality impacts on student learning and achievement. Therefore, it is reasonable to suggest that this would also be the case in diabetes education.

In this thesis, the quality of the statements made by the diabetes educators about teaching and learning are rated on the following 4-point scale:

1. statement only;
2. statement + example or a description;
3. statement + justification; or
4. statement + evidence of link to theory.

This rating scale is simple and useful in categorising the statements made rather than the CDE's knowledge of teaching and learning. There are however many examples of indicators to determine the quality of the teachers' knowledge in the education literature. As a means of organising them Lawson, Askell-Williams, and Murray-Harvey (2009, p. 249) developed the Quality of Knowledge Framework (QKF), which captures most of the indicators suggested by other education researchers.

This thesis uses a more simple rating scale as the data statements collected were made in response to practical diabetes education scenarios rather than tests of knowledge and beliefs about teaching and learning.

The classification of the diabetes educators' knowledge and the quality of their statements are analysed in this thesis to provide information about their understandings about teaching.

In this thesis the understandings of the roles of the CDE (teacher) and patient (learner) in relation to their responsibilities and their understandings about teaching and learning in the diabetes education exchange were investigated. It was anticipated that there could be some misconceptions about teaching and teachers, learning and learners and teacher pedagogical knowledge that was limiting or restricting the patient and their learning. It was also expected that there would be differences in the conceptions of their roles that would interfere with the plans and intentions of the diabetes educator and the patient.

To explore these issues and the effect on learning the following research questions were identified.

- What is the understanding of the CDE about their role when teaching BGM?
- What is the understanding of the patient about the CDE role when teaching about BGM?
- What is the understanding of the CDE about the patient’s role when learning about BGM?
- What is the understanding of the patient about their role when learning about BGM?
- What understandings do CDEs hold about teaching and learning?
- What understandings do patients hold about teaching and learning?
- What is the quality of the understandings held by CDEs about teaching and learning?

Summary

In analysing what currently occurs in a *typical* diabetes education session and acknowledging that the desired outcomes of education were not being achieved, I determined that it was necessary to look at the education process in detail. The diabetes education process has, since its evolution in the 1970s here in Australia, focused on the provision of information. This approach assumes that the person with the diabetes (the learner) is keen to learn, capable of learning, able to carry out the activities taught and will continue to do so, will recognise any problems or changes and will seek further assistance if any problem or change occurs.

Most diabetes education research has focused on what information is given, how it is given and the effectiveness of this information provision in terms of blood glucose levels. Almost no diabetes education research has investigated the process of learning that occurs following this information provision, nor has it reflected the related teaching approaches associated with this information processing of the learner.

It is useful to look at the teaching and learning practices in diabetes education to understand what the person with diabetes may be doing when processing the information provided by the diabetes educator and the expectations of the patient and diabetes educator about the education session.

Diabetes education is situated within the health care system and is primarily conceived of as a health care process. Embedded within this there is an educational process, and a teaching–learning interaction which in turn, potentially impacts on the health care process. This thesis focuses on the teacher–learner exchange and the effect of the perceived roles of the CDE and the patient on the teaching–learning interaction and the subsequent patient understanding and self-care of their diabetes. “There has been little or no research on the relationship between perceptions of learning environment, approaches to learning and qualitative differences in students’ learning outcomes” (Trigwell & Prosser, 1999, p. 252).

Shulman’s (1986a) seven categories and Grossman’s (1995) knowledge of learning category make up the eight categories of teacher knowledge and beliefs used in the analysis of the data collected for this thesis. The COATSRUAM framework developed by Lawson (2000) is used to analyse the participant statements to identify evidence of learning or actions involved in learning. Then the statements are rated on a 4-point scale for quality of understanding about teaching and learning.

In addition, the roles of the diabetes educator and the person with diabetes are explored. This is because the self-perception of the diabetes educator as either a nurse or an educator will impact upon their effectiveness as a teacher and the perception of the learner of them as either a teacher or a health care provider. Trigwell and Prosser (1999) note, “students’ perceptions of the teaching and the course can affect their approach to learning” (p. 254).

If we represent the problem of diabetes education as a teaching–learning problem then we need to ask about the CDEs’ and patients’ understandings and conceptions of their roles and responsibilities in the teaching and learning exchange. Understanding these conceptions is important in order to better understand how to assist the person with diabetes to learn about their diabetes so that they can more effectively care for themselves.

In conclusion, diabetes is a major international health problem with high morbidity and mortality rates. Diabetes education is a key strategy to resolve this problem for the health system. It is high stakes education for the person with diabetes and the health system. Diabetes education is an educational event involving interaction between a teacher and a learner and content. The work of the teacher is complex. The demands on the learner are complex. The objective of both the teacher and the learner is self-management. However, we don’t see in research on diabetes education a detailed focus on the complexity of teaching and learning. This is the focus of this thesis.

This research provides accounts of teaching, learning and the role of the CDE and the patient from their perspectives.

CHAPTER 3

METHODS

Introduction

This chapter discusses and describes the methods used in the three studies in this doctoral research.

This was an exploratory study in the field of diabetes education, designed to investigate the understandings of diabetes educators and patients about teaching and learning for blood glucose monitoring (BGM) as they undertook their initial diabetes education sessions. The study makes use of a range of research methods, each selected to answer the questions posed in a specific stage or phase of the research.

The qualitative methodology used in this thesis is an interpretive approach where the researcher observes and describes the phenomena being explored in its context. In this research, the perspectives of diabetes educators and patients about teaching, learning, their roles and ‘diabetes education as a teaching and learning event’ was explored in the context in which it occurs, which is one-to-one (1:1) and group education sessions.

The research was undertaken using face-to-face semi-structured interviews, video-taped education sessions, observational field notes and email interviews. The process for development of the interview questions is outlined in this chapter.

Methodology

There has long been a debate about the status, advantages and value of different research methodologies. For many years, quantitative methods and methodologies were perceived with great admiration. Even today, the double-blind randomised controlled trial (DB-RCT) is still held as the gold standard in disciplines looking for *proof* and *truth* that drug A or intervention X is the best. It is an important research method and the focus is on the deductive process and systematic observation, control and measurement. “The aim is to find causal relationships between the variable and thus to predict events” (Mason, 1993, p. 869).

This ability to predict events or outcomes is very useful in health care research and has been taken up strongly in recent decades under the guise of evidence-based practice (EBP). EBP has grown out of the recognition that we need to know, rather than believe, that an intervention in patient care is effective (Peat et al., 1998, p. 327).

However, it is inappropriate to undertake a RCT when the basic objective of the research is exploratory and the aim is to generate hypotheses rather than to test hypotheses.

> Knowledge without understanding does not permit the application of research findings to human action. In the health field, which has been dominated by the ‘knowing’ model, policies to promote people’s health that are formulated on the basis of research findings have largely failed because they have been devoid of understanding of the how and why interconnections between ‘variables’. (Oakley, 1992, p. 344)

Many treatments are thought to be effective but fail in RCTs when adherence to the protocol by participants diminishes.

Understanding how and why patients adhere to a treatment or medication has been the subject of studies over many years. It is well understood that treatment and medication adherence affects the efficacy of treatment and the desired health outcomes (Krueger, Berger, & Felkey, 2005). There is also evidence from the World Health Organization (WHO) that adherence to prescribed medications across multiple chronic diseases, including diabetes, is about 50% (WHO, 2003).

A good example of this in diabetes care is the two internationally renowned studies on diabetes in the United States and the United Kingdom (DCCT Research Group, 1993; UKPDS Group, 1998). In these studies the subjects were required to achieve tight blood glucose control (between 4–7 mmol/L) by monitoring their blood glucose levels at least four times per day and in the DCCT injecting insulin up to four times per day. The results of the two studies were significant as they demonstrated decreases in complication rates of up to 60% in participants who adhered to frequent monitoring and injection protocols to achieve tight blood glucose control 24 hours a day. These studies have been hailed as confirmation of current treatment approaches, which promote the importance of tight blood glucose control. However, the participants in the study were required to adhere to regimes they did not normally follow and did so with a very high level of access to and support from health care professionals to achieve this goal. Follow up studies of the participants identified that most participants did not continue to adhere to the tight blood glucose control protocols. Thus, the quantitative aspects of this research demonstrated the benefits of the intervention (tight blood glucose control with high level support from health professionals) and the qualitative data identified the difficulties for patients trying to achieve these goals as part of their everyday life.

This thesis is interested in the perspectives of diabetes educators and people with diabetes about teaching, learning and their roles in diabetes education. To research this topic requires methods which reflect how these people interact with and understand each other and the world. This is best undertaken using qualitative research which was developed in the social sciences as a tool for understanding human behaviour in context (Peat et al., 1998, p. 327).

Qualitative methodologies can be used to provide the basis for more detailed quantitative studies when a research issue is being explored. Qualitative methods are not the poor relation of quantitative methods but serve different purposes to the latter. As Kaplan said in 1964, “quantities are of qualities, and a measured quality has just the magnitude expressed in its measure” (p. 207).

There is, as suggested here by Kaplan (1964), a qualitative element in all research.

Qualitative procedures can generate different data for which quantitative procedures are not suitable. An example is the use of verbal reports which have received criticism about how these reports are processed and turned into data (Ericsson & Simon, 1993, pp. 1-2). Dey (1993, p. 10) notes that qualitative data deals with meanings which are mainly represented in language and action. It is also relevant to note that at the basis of much modern cognitive science are principles established through the use of verbal report data, such as that used by Ericsson and Simon (1993).

In addition, qualitative methods can provide the “social and cultural construction of the variables which quantitative research seeks to correlate” (Silverman 2001, p. 40).

Silverman (2001) echoes the arguments made by Howe and Eisenhart (1990), that the standards of research are the same for analysis of qualitative or quantitative data, it is just the procedures which are different.

Berg (1989) suggests that all data is qualitative because it refers to people, objects and situations. Some data will be easily quantified while other data best left in its original form with all the richness and texture accredited to qualitative data.

> All observation involves theorizing, and—for science, at any rate—perception is impossible without conceptual processes. It is hard to improve on Norwood Hanson's (54:7) formulation: "There is more to seeing than meets the eyeball." (Kaplan, 1964, p. 131)

The fundamental issue here though, is not which type of research (qualitative or quantitative) you plan or prefer to undertake, but rather which method is appropriate in seeking answers to the questions established for the research. It is the research questions that drive the study and these questions also drive the collection of data, which in turn drives the methods and therefore the methodology (Howe & Eisenhart, 1990). If there is consistency throughout this line of thinking then the appropriate methodology will become evident. Thus the debate about which method or methodology is better or more valuable should be reframed to ask which method and methodology enables the researcher to answer the research questions.

Qualitative researchers are often noted for trying too hard to include all details of the data in the name of retaining the richness and texture of the experience under investigation. To achieve this in a simple way, the context or 'sense' of an event or phenomenon is often merged into the more tangible field notes. As identified by Behrens and Smith (1996), the data is both that which is collected about the "presentational aspects of the phenomenon under study" (p. 949) and the "second representational level of data that comprises the records of experience—tally marks, field notes, survey responses, tape recordings" (p. 949).

This problem of translation of exactly what happened and perhaps even why it happened remains difficult. Margin notes of the researcher and comments within the raw data can retain some of this valuable 'experience' and there are now ways to convey the power and intent behind a silence in a transcribed interview that assists the researcher to recall key elements of the data collection experience. In this study the richness and accuracy of raw data will be retained through audio and videorecording and all new information will be transcribed and entered into the NVivo program to minimise the loss of contextual influences.

The mere presence of the researcher in the field is known to alter the context, behaviour and responses of the subjects and the environment being researched. In quantitative research the distance between the two is less direct and aims to prevent any influence or bias with any breaches seen as failure of the methods employed. In qualitative research, it could be said that the opposite is true. Rather than try to avoid contact, the research is perceived as participatory and all contact, while within protocols, is visible and transparent.

The analysis process acknowledges the significance of the researcher presence in the phenomenon and clarifies the level of influence on the data. Interview transcripts were checked with participants as an accurate record of the interview and for accuracy of intent. The analysis was independently undertaken and then checked for reliability of analysis to ensure inter-rater reliability.

Behrens and Smith (1996, p. 949) said that “common to all data analysis is that the process of analysis is social”, and that “both quantitative and qualitative researchers anticipate the scrutiny of readers and critical audiences (Bazerman, 1988; Signorile, 1989)” making the analysis social.

As part of this social process of analysis, the final construct or result must be shared and disseminated. To do this the outcomes must be succinct, tangible and of interest to the audience. It is with these characteristics in mind that each step of the analysis process must be clear, documented and re-traceable. This process of constructing meaning is a delicate balance of rigorous analytical methods while retaining the essence of a phenomenon. It is then the responsibility of the researcher to represent the meaning and have that representation subjected to argument and critique.

Research Questions

The research questions for this study were developed over a long period of time and initiated from a general desire to improve diabetes education. This general desire was quickly focused on understanding the adequacy of the educational process and the way people with diabetes understand how to manage their condition to minimise, prevent or delay the onset of life-threatening complications. How people understand their diabetes management and the implications of their management decisions through the formal diabetes education process is investigated in this research through the lens of the teaching and learning processes.

The breadth and depth of literature in diabetes, health and education presented in chapter two demonstrates the gap in research into diabetes education as a teaching and learning event. The need to examine what diabetes educators and people with diabetes know and understand about their roles in diabetes education as well as what they know and understand about teaching and learning became the focus of this thesis.

What we do know is that:

- diabetes education is a valued component of diabetes care
- most people with diabetes receive education about self-management of their condition
- people with diabetes continue to have life-threatening complications despite having received education about their condition and how to prevent complications
- diabetes education is a teaching-learning event
- teachers and learners have conceptions about their role in any teaching-learning event which impact upon the learning outcomes (Colagiuri et al., 2009).

Thus, it is important to investigate what happens during the teaching and learning exchange called diabetes education and to collect data about activities that affect learning and subsequent self-management by the person with diabetes.

This research is centrally concerned with the efficacy of self-management of diabetes in the general diabetes population. It focuses on whether there is in teacher and learner, educator and patient, the development of good quality knowledge about how to effectively acquire and store knowledge that is to be developed from the initial period of diabetes education into life-long self-management skills.

Aim

The aim of this research is to develop an account of the knowledge and understandings of diabetes educators and patients about teaching, learning and their respective roles in diabetes education to increase the effectiveness of diabetes education.

Given the aim, the following research questions were identified.

- What is the understanding of the CDE about their role when teaching BGM?
- What is the understanding of the patient about the CDE role when teaching about BGM?
- What is the understanding of the CDE about the patients' role when learning about BGM?
- What is the understanding of the patient about their role when learning about BGM?
- What understandings do CDEs hold about teaching and learning?
- What understandings do patients hold about teaching and learning?
- What is the quality of the understandings held by CDEs about teaching and learning?

In order to ascertain strategies and techniques which would provide useful responses to these questions pilot studies were undertaken.

Pilot Studies

In preparation for this research, three small-scale pilot studies were undertaken. The first form of inquiry was to review a series of recorded education sessions from previous research into the development of diabetes educator performance indicators for the Australian national core competencies (Siebert & Hill, 2003). The videos revealed the complex nature of diabetes education, the impact of limited time on teaching, some of the difficulties associated with checking patient knowledge and skills, and the possible conflict between the CDE roles of counsellor and educator which were expected by different patients.

Specific examples of diabetes educator and patient interactions during the video-taped education sessions included:

- A one hour education session to teach blood glucose monitoring which involves three main pieces of equipment, a series of at least six steps, knowledge of normal results and the ability to interpret, record and act upon the result. The patient is given the information, shown the steps and is able to have one or two shortened practices of the procedure.
- A patient who forgets to bring his blood glucose monitoring record book and his new meter to have his monitoring technique checked and at the end of the shortened session happens to mention he is Muslim and as it is Ramadan he is fasting—Is that okay with his diabetes management?

- A patient who talks continuously about herself, the problems with her daughter, her dislike for her eye specialist, her recurring hypoglycaemia, her high blood pressure and her distress at trying to manage a hypo overnight at home alone, with her daughter ringing every hour to check she is okay.

Each of these recorded sessions raised significant educational issues and demonstrated the differences between diabetes educator and patient expectations about the session. As evident above, patients arrive with their own issues and concerns, many of which are not about their diabetes. The diabetes educator has to decide what the priority for the session is, how to address it and then what to do in the limited time allocated. The educator would be aware that a distressed patient is not likely to be ready to learn.

The second pilot study involved two diabetes educators from different education centres keeping records of calls made to them over a week from people who have received their initial diabetes education and are seeking further management advice. One centre was at a public hospital and recorded 22 calls. The other was at a diabetes support organisation where they received 25 calls. The calls covered complex issues and questions about aspects of care the person would be expected to know in early stages of an education program. Specifically, 50% of the hospital calls and 68% of those at the support organisation were about topics which could be expected to have been covered in initial education sessions. Thus, a good proportion of people making these calls might have been expected to answer, or problem-solve the answer to, these topics, if their initial period of education had been effective. Examples of topics raised in calls included:

- fluctuating blood glucose levels and unclear about how to treat;
- effects of medications (Metformin) and should they keep taking the medication;
- forgot to take insulin, needs advice;
- footwear advice;
- what is HbA1C;
- information about what foods to eat; and
- starting insulin, unsure of the effects.

Whilst this is only an informal survey, in the practical world these issues question the efficacy of the formal diabetes education for these patients. Enquiries about issues that we might expect the well-educated patient to solve on their own translate into increased costs of educator time, or, if left unanswered, potentially result in additional interventions and treatment of complications. This additional work impacts on the health care system and the services provided as health care costs escalate. In this sense diabetes education is high stakes education for society.

The third pilot study was a trial of the interview questions with a CDE who was not included in the studies reported in this thesis (see Appendix 1). This was undertaken to determine the usefulness of the questions and to begin to determine suitable coding processes. This process revealed the usefulness of most questions with some need for refinement (see Appendix 2). In particular, this process confirmed the need for a follow up interview to probe the CDE and patient understandings, and to further clarify the meaning of some terms and the conceptions held by the CDE. It was also noted that a second interview would provide an opportunity for the CDE to review his/her expectations of the patient and to see if these had been met.

In the pilot interview, the CDE had two distinct understandings of her role as shown in the table below. One understanding of the role was about formal teaching and giving of information. The other understanding was that of counsellor and support person. This distinction was clarified with the CDE at the second interview. It was recognised that the distinction was just one example of CDE understandings about the role and may not reflect the understandings of other CDEs. The usefulness of this distinction at this pilot stage of the research was that it served as a measure of the effectiveness of the interview questions.

Table 3.1. Two main understandings of CDE role from Pilot Interview.

Formal teaching	**Support/counselling**
Explicit	Supportive
Transmission	Facilitate
Traditional	Assist with motivation
Talking to	Co-learning
Speaking of	Conversational
Teaching practical things: BGM, insulin, food, exercise	Counselling
Skill teaching	Guidance
Nurtured or parented	Fluffy stuff
Quote studies	

Note. CDE = credentialed diabetes educator; BGM = blood glucose monitoring.

These understandings held by the CDE provide information about two conceptions of teaching held by the CDE. This informed the research development by identifying that CDEs are likely to have one or more understandings about teaching which will influence their plans, intentions and actions. Thus it was important to use techniques in the interviews to provide multiple opportunities for the CDE to reveal the range of understandings they hold and can draw upon when teaching.

This differentiation can be seen in the following quote.

> I guess I usually use words like support, facilitate, um, assist with motivation um, for the, um, for the more fluffy stuff and then for the formal stuff its fairly obvious, like um, teaching you to monitor, teaching you to give yourself insulin, teaching you about food, teaching you about exercise, and it's more of a teaching thing than the supporting thing, yeah

The CDE also appeared to have two different versions of the patient/student/learner, and these were clarified further at the second interview. The two understandings of the patient role were of the patient as the student or as the consultee. The role of the student was represented as a recipient of information while that of the consultee was seen more as an equal. There was very little information presented about how the patient constructed knowledge. This was possibly as a result of the sequence of the questions and the fact that the person was there for a first appointment, which altered the focus of the appointment from education to predominantly being about assessment and information collection. It was very clear that the CDE expected all people/patients to be honest, polite and accountable.

Table 3.2. Two main understandings of patient role from Pilot Interview.

Patient-as-student	Patient-as-consultee
Wants to be told	Empowered
Receptive	Conversational
Ready to learn	Guiding
Practical	Construction
Prepared to receive instruction	Co-learner

The patient-as-student role focussed on when the patients want to be told what to do to manage their diabetes. They have arrived ready to learn and were seen as receptive to what they were being told. The patient was seen to be prepared to receive instruction. The patient-as-consultee or co-learner is a person who is seen as an equal and would be empowered by the CDE to learn through conversation and discussion. The CDE aimed to guide the learner in the management of their diabetes through discussion about real life experiences and how best to manage them. There were elements of the supportive role of the CDE here. There was an assumption that the patient has constructed a knowledge base about diabetes and the teaching-learning event was now more about discussion of the practical application of the knowledge in the patient's life.

> I can see myself talking to somebody and then we almost go into learning mode, we go into teaching mode, but then, so right, let's do the monitor and lets do this, so it's almost a different mode from a conversational counselling level to a teaching, a practical process, so um, so how would I see them, how would I describe them, sometimes they're a learner.

The CDE's view of the learning process was that patients usually have a bit of knowledge about their diabetes, they d been given some more by her, they would develop questions and make written/mental notes about what happens between appointments and then ask these at the next appointment.

The CDE expected the patient to act on issues related to their diabetes (such as a high blood glucose level) and to recognise when to contact her (BGL too high). The CDE had an expectation that the patient would engage in some mental activity between sessions and return more informed.

> I expect him to act if his sugar level stays high, so I expect him to ring me or go to his doctor if his sugar levels high, stays high by Friday, I expect him to purchase a blood glucose meter, because he indicated that he'd go and do that now, on the way home, um, and I would expect that he would have thought about some of the concepts that we spoke about even if he doesn't read the information that he's perhaps had a think about how he wants to approach exercise and had a bit of a think about food and considering he's going to the dietitian in a couple of weeks I would expect that he's a bit more informed.

There was some congruence between the two conceptions of teaching and the learner's role within each of these models. There was a suggestion that the activities of teaching would be altered based upon the role adopted by the patient/learner. For example, the person who wants to be told/taught is more likely to receive a formal type of education. The person/consultee who wants to be guided as a co-learner is more likely to get the *fluffy* conversational style of teaching. This would suggest there was some form of teaching-learning assessment occurring with each patient to determine the most effective teaching approach. The exact nature of this assessment process was not clear.

This third pilot study informed the design of the thesis by identifying the need for multiple opportunities for the CDE to provide information about their understanding of teaching and learning. It also identified the need to interview the person with diabetes to explore their understandings of their role, teaching and learning to better understand how the similarities and differences between the patient and the CDE may affect the learning in the diabetes education session.

In summary the following key points were identified as important for the design and data collection in the thesis:

- Both the CDE and patient understandings of teaching and learning were needed to explore factors influencing the education process.
- The patients needed to be interviewed before and after consecutive education sessions to provide information about their understandings of teaching, learning and their role in the education process, as well as the outcomes of the patients' learning in the initial session.
- The questions for the person with diabetes (patient) needed to start with more general questions about the individual's diabetes to gain both insight into their knowledge of their diabetes, but also to encourage them to relax in order to respond more fully to the research interview questions.
- There was a need to observe the education session to identify teaching and learning activities which may not be recalled or identified by the CDE or patient as teaching or learning episodes.
- Videorecording of the education sessions was important to reduce the interference of the researcher in the usual practices and interactions of the CDE and patient.
- The second education or repeat session was needed to check the outcome of the first education session (i.e., could they monitor) and to identify teaching and learning activities related to recall and utilisation of knowledge and skills.

- Field notes would help to capture the context of the education setting, the personal view of the CDE before and after the education session and other factors which may influence the interaction between the CDE and patient.

Research Design

Overview

Based on the outcomes of the pilot study and the research questions, the original research plan was to use observation and interview techniques to gain a picture of the diabetes education session as a teaching–learning event with a set of educators and their patients from different hospitals in a single study.

This initial plan involved collection of data from interviews immediately before and after the education session to determine the understandings of the CDE and patient about teaching, learning and each of their roles. The CDE and patient would be interviewed before and after two consecutive education sessions. The interviews were semi-structured and audio-taped for accuracy and transcription.

Each CDE and patient series of interviews and education sessions were grouped and considered as a case. This approach was used to reflect the ongoing nature of the education process and the opportunity afforded CDEs and patients to develop their understanding across two education sessions. The CDE understandings could then be analysed within and between cases, acknowledging the unique learning needs of each patient.

Field notes were documented to capture the environment, the context and the ‘casual conversations’ between the CDE, patient and researcher. These notes added context to the interviews and assisted with probing questions of the CDE.

The education sessions were videotaped. The videorecording facilitated later analysis and comparison between what occurred in the session with the plans and questions identified by the CDE and patient prior to the education session. The video-taped data also provided examples of teaching and learning activities which were not always acknowledged by the participants in the interviews after the education session.

To limit the focus of the education session, the topic of self-monitoring of blood glucose (SMBG) was chosen as this is a common topic taught during initial diabetes education for people with type 2 diabetes.

Recruitment proved to be very difficult with only two CDEs volunteering and recruiting suitable patients at one hospital. At a second hospital two CDEs volunteered but did not recruit any patients for the study. At a third hospital two CDEs were willing to participate but were prevented from involvement by their manager, despite ethics approval from the institution. In the end, there were two CDEs and four patients recruited, interviewed and video-taped before, during and after two individual education sessions each. This provided 32 audiotaped interviews and 8 videotaped education sessions in total. This data set became known as Study 1.

To extend the pool of participants and data for analysis, a diabetes support organisation which provided group-based diabetes education in the community was recruited as an alternative source of diabetes educators, patients and diabetes education sessions. At this organisation a further two CDEs volunteered and recruited suitable patients from the group. After delays due to cancellations of group sessions on account of low numbers, staff illness and staff resignations, one CDE and two patients participated in the research. Owing to the different context of both the group and the community setting this data set became known as Study 2.

Given that the pool of diabetes educators was still only three and thus potentially not representative of the range of CDE understanding of teaching, learning and their roles in diabetes education as a teaching and learning event, Study 3 was created. Study 3 was designed to reach a greater number of CDEs and explore their understandings of teaching and learning. There were no patients in this study as it was not feasible to seek their participation from across the country.

In Study 3, CDEs were recruited via the Australian Diabetes Educators Association (ADEA). Emails seeking volunteers were sent from the ADEA for CDEs to participate in a series of email interviews about teaching and learning (see Appendix 3). This provided data from CDEs about their role, the patient role, teaching and learning. It was not possible to collect data from the patients seen by these CDEs which is a limitation of this set of data. However, this mode of data collection provided a significant increase in the number of participants and broadened their locations to beyond one state of Australia.

In summary, the three studies provide a suitable set of participants to answer the research questions and achieve repetition and thus saturation in the conceptions and understandings of CDEs. As the original plan to recruit pairs of CDEs and patients proved impossible the additional studies added participants from a different mode of education (groups) which gives an advantage in coverage of two types of education. If left at these two studies, there would have been understandings from three CDEs and six patients. The creation of the third study expanded the data collection to include a further 22 CDEs from across Australia. As an exploratory study about the understandings of CDEs and patients' knowledge and understandings of teaching, learning and their roles in diabetes education, having information from these three studies provides benefit to the diabetes education body of knowledge.

Ethics

Ethics approval was gained from the Flinders University Social and Behavioural Ethics Committee for all three studies which was accepted by the relevant institutions and organisations. Ethics approval was also gained from the regional health service Ethics of Human Research Committee for participants in Study 1

Ethics is a fundamental aspect of all research. The credibility of both the research and the researcher are founded upon ethics (Johnson & Christensen, 2000). The joint NHMRC/AVCC Statement and guidelines of Research Practice (1997) highlight a number of ethical principles for researchers. These principles are also congruent with those of the Ethical Standards of the American Education Research Association (Johnson & Christensen, 2000, pp. 70-75). To obtain ethics approval for research, a study must adhere to these principles:

- All participants participate voluntarily and give their informed consent.
- The research participants must know that they are free to withdraw from the study at any time without prejudice.
- The research participants are protected from physical and mental discomfort, harm, and danger that may arise from the research procedures.
- The research participants have a right to remain anonymous, and the confidentiality of the participants and the data must be protected.

Each of these principles contains more specific considerations for the researcher and all were followed in each of the studies in this thesis.

Informed Consent

People who agreed to participate in the study were informed of what was required, the expected time commitment, their rights to access transcripts and their right to withdraw at any time from the research without any prejudice.

If they did not wish to be a part of the study, or they decided to withdraw from the study, their decision was accepted without question. Transcripts of all formal interviews were sent to the respondents so they could check and amend as necessary.

Withdrawal from the Study

Participants were free to refuse to be part of the study, or withdraw from the study at any time. The researcher did not enter into any correspondence about their withdrawal and all related data collected was destroyed.

Each of the three studies had participants withdraw.

Study 1

One patient did not attend for the second education which excluded them and their CDE from the study. One patient and CDE data were excluded because the videotape did not record the education session.

Study 2

One patient cancelled their attendance at the group education session and thus withdrew from the study. Four group participants changed their date of attendance at the group education session to avoid participation in an education session being videotaped for research.

Study 3

Forty-five CDEs responded to the initial recruitment email. Twenty-three CDEs were not included in the final data set because one was not eligible (type 1 patients only), five did not respond to emails, and 17 only answered the first series of interview questions.

Protection from Harm

The studies did not cause any participant to experience any physical or emotional harm. Their diabetes education was not altered in any way to be different to that which they would normally expect from the relevant institution or CDE. There was no expectation that any data collected reflected, either positively or negatively, on the CDEs involved, and as such it was not expected that their employment, promotional chances or peer relationships was harmed in any way.

Anonymity and Confidentiality

All data collected is stored securely and all information collected is confidential. All refusals and withdrawals from the study have also remained confidential. All participants and related diabetes centres were advised of the need for confidentiality in writing before the studies commenced.

The Issue of Bias

The issue of bias confronts all researchers and is of concern because it may cause skewing of results due to personal preferences or prejudices of the researcher. All researchers bring with them their own personal perspectives on the issues under investigation and these may affect the results, if only because the entire study has been conducted from this perspective. Rather than ignore or hide possible biases, researchers are encouraged to identify them and the ways in which they will be minimised. It is considered better to acknowledge the biases than to pretend that the research has been carried out in a social vacuum (Waddington, 1994).

Many of the diabetes educators involved in the studies were known to me prior to participating. However, I had limited prior knowledge of their understandings about their role and their education practices.

Study 1

Procedure

In Study 1 there were two groups of participants, the two diabetes educators and the four patients. The diabetes educators were recruited from a sample of convenience from major public teaching or large private hospitals. All major public teaching and private hospitals, with a designated diabetes education service or centre with four or more diabetes educators were considered as possible sites for the research. The institutions were identified as suitable for data collection because they:

- provided regular diabetes education on an in-patient, outpatient, individual and group basis;
- represented the two forms of health care in Australia being public and private hospitals; and
- provided services to diverse community groups with different patient cohorts from different socio-economic backgrounds.

Participants

CDEs

There were two CDEs from one hospital and for each CDE, two of their patients volunteered and participated in Study 1. The total number of participants was six with two CDEs and four patients.

In keeping with the ethics requirements to maintain participant confidentiality, diabetes education centres with four or more CDEs were identified as suitable venues with two CDEs in each venue participating. The need for two diabetes educators from each venue was identified to *add confidence* to the findings. According to Miles and Huberman (1994), “by looking at a range of similar and contrasting cases, we can understand a single-case finding, grounding it by specifying *how* and *where* and, if possible, *why* it carries on as it does” (p. 29).

This sample of CDEs was a self-selecting purposeful sample of convenience. It was limited in its randomness but a willingness to participate was important given the need to intrude into these professionals’ work lives and the nature of the research, which surveys their performance.

The CDEs were very enthusiastic and two to three CDEs in each institution volunteered. The final selection of which CDE participated was decided by the recruitment of suitable patients willing to participate as the combination of the CDE and patient was crucial to the data collection process. Not all institutions participated in the research due to difficulties recruiting patients and managers unwillingness to allow CDEs to participate. At one institution, one CDE participated but due to problems with the video-tape in the education session and the patient not attending the second session, the data set was incomplete and thus not able to be included.

Patients

Criteria for selection of the patients included that they be English-speaking people with newly diagnosed type 2 diabetes who were seeing a diabetes educator who is participating in the research. The patients were initially identified as potential participants through attendance at introductory group education sessions or when making appointments with a participating CDE. Patients meeting the selection criteria were given an information sheet and if they expressed interest in participating they were contacted by phone to clarify their understanding and willingness to participate. Information about the study along with ethics and consent requirements were explained during the phone calls or at their first appointment. Then arrangements were made about dates and times for interviews and their education sessions.

This sample of patients was also a purposeful sample of convenience. It was limited in its randomness but the need to be linked to a participating CDE was the primary driver for participation.

Data Collection

Each CDE and patient was interviewed individually before and after the education session, with each interview running for approximately 30 minutes. This process was repeated at the next scheduled visit for the patient, which in each case was about one week later. Thus, each CDE and each patient participated in one pre-education session interview and one post-education session interview for two education sessions. This generated between 16 and 20 hours of interview data across the six participants. The pattern of data gathering sessions is shown in the table below.

Table 3.3. Study 1: Interview and data collection process

	Patient A		Patient B	
CDE 1	Interview before	Interview before	Interview before	Interview before
	Education session 1	Education session 2	Education session 1	Education session 2
	Interview after	Interview after	Interview after	Interview after
	Patient C		**Patient D**	
CDE 2	Interview before	Interview before	Interview before	Interview before
	Education session 1	Education session 2	Education session 1	Education session 2
	Interview after	Interview after	Interview after	Interview after

Note. CDE = credentialed diabetes educator.

Semi-Structured Interviews

The interviews were designed to identify the knowledge and understandings of the CDE and the patient about teaching, learning and each of their roles. The sequence of activities in the research process was selected to minimise the time required by patients to attend the education centre and to fit in with the CDE schedule. As part of the data collection process and to capture the understandings of the CDE and patient, it was important to talk to each of them prior to and immediately following the session. To minimise the impact of time lost, the CDE used the time while the patient was being interviewed to write up notes from the education session. Potentially this activity assists the CDEs to recall key issues about teaching and learning for the interview. All interviews were audio-taped and transcribed.

Following the first education session, the audio-taped interview, video-taped education session and field note data was reviewed for key issues by the researcher. The key issues identified in this data were then added to the interview notes for the second education session. An example of this was with Patient A who was very nervous before the first education session and very confident afterwards. It was important to check on her self-efficacy a week later prior to the second education session to observe what affect, if any, her anxiety had on her learning.

The second education session then followed the same sequence of events as outlined in Table 3.3.

Pre-education session 1 CDE interview

Interview questions used for the CDE, which were refined after the pilot study, are outlined in Appendix 4. The pre-education session interview was focussed around three main questions:

Question 1: What can you tell me about your role in relation to this patient you are about to see?

Question 2: What can you tell me about the role of the person in this session today?

Question 3: Can you tell me what you want to achieve in the education session you are about to do?

Depending on the answers provided, one or more of the following questions would be asked:

- Tell me more about being a …?
- What did you mean by …?
- Can you give me an example of what you do as a …?
- How does … help the patient to learn?

This question style was designed to see what answers the CDE provided and then probe their understandings of the words and terms used to describe their role, the role of the patient and their intentions or plans (Kerr, 1981) for the forthcoming education session. If these probing questions were not able to elicit further information then cueing questions were asked. Cueing questions were deliberately asked after probing questions.

Probing questions used information provided by the participant and did not introduce any new information. Thus new information was not introduced that might have activated knowledge in long term memory. The cueing questions were used to explicitly introduce new information, but without leading the CDE responses down a particular path. Examples of these included:

- Is there a name or label you would use to describe your role: a teacher? a nurse? a counsellor?
- What does this mean to you?
- In what way will you be a (teacher / nurse / counsellor)?

Post-education session 1 CDE interview

After education session 1 the CDE was asked four main questions, each with some related probing questions.

Question 1: What can you tell me about the session you have just finished?

Question 2: What do you expect the patient to know/understand after that session?

Question 3: Can you tell me what you did that would be an example of teaching?

Question 4: Was there anything the patient did that would be an example of being a student?

Probing questions

The probing questions were asked when the CDE had difficulty expressing an answer and to give them an opportunity to find alternative ways to express an answer. The probing questions were also used to explore their responses to ensure clarity of their ideas and understandings.

Question 1

- How do you feel about the session?
- Did you achieve what you wanted? What did you do specifically to achieve …?
- Did the patient do what you expected? Can you give me an example?
- What parts of the session do you feel went well?
- What changes (if any) would you make to the session?

Question 2

- Tell me more about …?
- What did you mean by …?
- Can you give me an example of …?

Question 3

- Tell me more about …?
- What did you mean by …?
- Can you give me an example of …?
- How does … help the patient to learn?

Question 4

- Tell me more about the patient as a student?
- What did you mean by …?
- Can you give me an example of what you mean by …?
- How does … help the patient to learn?

At the end of the post-education session 1 interview the CDE was asked a broad open ended question.

Question 5: Is there anything else you want to tell me about the session?

The purpose of this question was to give the CDE the opportunity to mention anything they felt impacted on the education or the session.

Pre-education session 1 patient interview

The pre-education session 1 interview questions for the patient (see Appendix 5) were designed to assist the patient to relax and feel comfortable to share their thoughts and understandings. The interview started with very broad questions about their diabetes as these are questions the patient can definitely answer without concerns about getting it wrong.

Question 1: Can you tell me how you found out about your diabetes?

Question 2: Can you tell me how did you find out about the diabetes educator?

The interview then moved on to more specific questions about the role of the educator and the patent in the education session. Their expectations for the education session and their role in the session were probed to ensure their understandings were clear.

Question 3a: What is the role of the diabetes educator?

Question 3b: When you have these meetings with the DE what is s/he supposed to do?

Question 4a: What is your role?

Question 4b: What are you supposed to do?

The interview progressed to include broad informal questions designed to elicit their understandings about the purpose of their attendance at the education session, what they hoped to learn and how the diabetes educator would assist them to learn.

Question 5: Can you tell me why you are here today?

Question 6a: What do you hope to learn today?
Question 6b: What will you do to learn it?
Question 6c: What should the DE do to help you learn?

The questions about how they learn were included to explore the patients' understandings about their learning style and to see if they had any preferences for how they were taught. This included asking about any experiences they have had with teaching such as through art, sport, drawing, knitting etc.

Question 7a: What do you already know about …?
Question 7b: How did you learn about …?

Question 8a: What do you think learning is?
Quesiton 8b: When you learn something, what do you do?

Question 9a: What do you think teaching is?
Question 9b: When you teach something, what do you do?

The final section of the interview asked the patient about the role of the diabetes educator and what s/he did that could be called teaching. In this discussion about teaching, the notion of the diabetes educator's professional background was also explored to see if the patient knew the professional background of the educator. The patient was then asked if they had any questions they wanted to ask the diabetes educator and what they do when they do not understand something.

Question 10: Is the diabetes educator a teacher?

Question 11: What does the diabetes educator do that is teaching?

Question 12: Do you have anything you want to ask the diabetes educator?

Question 13: What do you do if there is something you don't understand?

The interview finished by asking patients:

Question 14a: Can you tell me one thing you remember from your last session?

Question 14b: Why do you think you remember that?

Post-education session 1 patient interview

After education session 1, the patient was asked the following questions (see Appendix 6):

Question 1: Can you tell me about what you learnt today?

Question 2: How long do you think you will remember what you have learnt today?

Question 3: Do you have another appointment – what is the purpose of that session?

Question 4: How does today's session link up with what you have learnt in the past/expect to learn in the next session?

Question 5: Is there anything you would like the diabetes educator to do differently to help you learn?

Question 6: How will you explain what you have learnt today to your wife/husband/partner etc when you get home?

It was important to see if the patient could identify what they had learnt, if they would remember it and what the CDE could do differently to help them learn. The patient was also asked to identify how the new knowledge linked with past knowledge and how they would explain what they had learned when they get home.

The last question is supported by a similar type of question asked in the research by Trigwell and Prosser (1991) which was to ask the “student to imagine they were telling a friend the sorts of things the lecturer was trying to teach them and wanted them to learn in the subject” (p. 255).

Question 7: Please describe what you think the content/subject matter of this course was about.

The interviews provided data for analysis about the understandings of CDEs and patients about their roles and the teaching and learning in the education session. The video tapes of the education session provided examples of teaching and learning.

Pre-education session 2 CDE interview

Approximately 1-2 weeks after education session 1, the interview process and education session observation were repeated for education session 2. The focus of the CDE interview before the education session was the CDEs expectation about the success or otherwise of the patient's ability to monitor their blood glucose level after their initial education session. The aim of the first education session had been to teach the person how to monitor their blood glucose levels. Hence, the interview questions for the CDE prior to the second education session were focussed on their expectations of the patient's experience with blood glucose monitoring at home and their plans and intentions for this second education session (see Appendix 7).

Question 1:	Can you tell me what you want to achieve in the education session you are about to do?
Question 2:	What do you expect the patient to know/understand prior to this session?
Question 3:	What do you think the patient thinks this education session is about?

It was also important to ask the CDE about their understanding of the patient's expectations for the session. The purpose of this question was to gain insight into the CDE's perspective about patient goals and learning needs for the education session.

Again, responses were probed with similar questions to those asked in the first education interview.

Probing questions

- Tell me more about …?
- What did you mean by …?
- How do you think you might go about doing that?
- Do you have any specific plans for this session?
- How do you think that will help the patient to learn?
- Do you anticipate any difficulties?
- What will you do about these difficulties?
- What do you think the patient will find most difficult?

The probing was designed to ensure the diabetes educator had every opportunity to demonstrate their understandings about their role and teaching and learning in initial diabetes education.

Pre-education session 2 patient interview

The focus of the interview questions for the patients was their experiences with blood glucose monitoring at home, any questions they had about their diabetes or blood glucose monitoring and their expectations for the education session (see Appendix 8). The initial broad question of “Why are you here today?” was to determine if the patient thinks they are there to show they can monitor their blood glucose level (or not) or if their presence is for a different purpose. Depending on the response, the interview either explored why the person could not monitor at home, or moved on to questions about the topic they have identified for the education session.

Question 1a: Can you tell me why you are here today?

Question 1b: What can you tell me about how you have been going with it since last week?

Question 2a: What do you already know about …?

Question 2b: How did you learn about …?

The interview questions then returned to ask about the patient’s understandings of learning, teaching and the role of the diabetes educator. This was to ensure the patient had sufficient opportunity to discuss their understandings about teaching and learning.

Question 3a: What do you think learning is?

Question 3b: When you learn something, what do you do?

Question 4a: What do you think teaching is?

Question 4b: When you teach something, what do you do?

Question 5: What does the DE do that is teaching?

The interview also explored their understandings about the role of the diabetes educator and the patient role in the education session. Again, the interviewer asked the patient if they had any questions for the diabetes educator and what they do if they do not understand something.

Question 6a: What is the role of the DE?

Question 6b: When you have these meetings with the DE what is she supposed to do?

Question 7a: What is your role?

Question 7b: What are you supposed to do?

Question 8: Do you have anything you want to ask the DE?

Question 9: What do you do if there is something you don't understand?

The final question was designed to check the patient's knowledge recall with emphasis on the most important thing they remembered from the previous session.

Question 10a: Can you tell me one thing you remember from your last session?

Question 10b: Why do you think you remember that?

The response was probed further when they were asked why they thought they remembered that particular thing. The purpose of these questions was to determine what factors influenced their learning and recall.

Post-education session 2

The post education session 2 interviews for both the CDE and the patient repeated the questions asked after the first education session. The CDE post education session 2 interview questions were designed to give the CDE a further opportunity to demonstrate their knowledge about teaching and learning.

Question 1: What can you tell me about the session you have just finished?

Question 2: What do you expect the patient to know/understand after that session?

Question 3: Can you tell me what you did that would be an example of teaching?

Question 4: Was there anything the patient did that would be an example of being a student?

The post education session 2 interview questions for the patient focussed on their learning and the strategies used in the education session to facilitate their learning.

Question 1: Can you tell me about what you learnt today?

Question 2: How long do you think you will remember what you have learnt today?

Question 3: Do you have another appointment – what is the purpose of that session?

Question 4: How does today's session link up with what you have learnt in the past/expect to learn in the next session?

Question 5: Is there anything you would like the diabetes educator to do differently to help you learn?

Question 6: How will you explain what you have learnt today to your wife/husband/partner etc when you get home?

The responses for both the CDE and the patient were probed to ensure multiple opportunities for each participant to make statements about their understandings of teaching, learning their respective roles in diabetes education.

Ethical Issues

Approval from the Flinders University Social and Behavioural Ethics Committee was gained for this study (see Appendix 9) prior to seeking ethics approval from the institutions associated with the diabetes education centres involved. Identification of the participating CDEs from a limited population and the research reporting on the performance and competence of the CDEs were raised as initial concerns by ethics committees of participating institutions. Reassurance was given and ethics approval granted after attending ethics committee meetings.

Ethical and moral issues of concern to me as a registered nurse (RN) was the potential for information to be given that was incorrect or potentially harmful to the patient participants. As an RN, I have a legal responsibility to report unsafe or unprofessional nursing practice and a moral obligation to not cause any harm. In consideration of this potential this possibility was discussed with the CDEs when consent was sought. During Study 1 in the data collection phase I became aware of a misunderstanding about a food choice by one patient participant. I provided the patient with a handout from the service and sought clarification from the CDE with the patient before they left the service.

Limitations

This study was limited by the number of CDE and patient participants. One institution where ethics had been granted withdrew the opportunity for their CDEs to participate citing “research was not their core business”. At another institution the CDEs agreed to participate but were unable to identify suitable patient participants prior to their attendance and with sufficient time to organise interviews. A change in the purchase of blood glucose meters from diabetes education centres to pharmacies also decreased the number of patients attending hospital based education centres for education about blood glucose monitoring.

Study 2

Procedure

Study 2 was developed in response to the limited availability of participants in one-to-one diabetes education sessions. The focus of Study 2 continued to be the understandings of the diabetes educator and patient about their roles in the teaching and learning exchange of initial diabetes education. The context for this study was group education rather than one-to-one education as in Study 1.

When identifying potential participants it became apparent that many institutions provided information about blood glucose monitoring in group education sessions but did not teach the use of a blood glucose monitor. Three community based diabetes education programs provided blood glucose monitoring education via group education and one was willing to participate in the research.

Study 2 of the research was designed to continue to explore the understandings of the CDE and person with type 2 diabetes about teaching, learning and their roles in education about self-blood glucose monitoring. In this study the context of group education would be different to the one-to-one education context in Study 1. Also, due to the predetermined sequence of topics for each session and the choice by participants to select which topics they attended there was no opportunity for a follow up education session and interview. However, the overall design and intent remained the same as in Study 1.

Participants

CDEs

Participants for Study 2 were recruited via a letter of invitation and information about the study once the community based organisation had agreed to participate. The organisation had four diabetes educators and all were willing to participate in the study. The group education sessions were offered in a series of topics over a period of a couple of months. The allocation of the CDE to the education session for blood glucose monitoring had been previously determined and this therefore determined which of the four CDEs was to participate in the study. The selection of the CDE participant was again a self-selecting purposeful sample of convenience.

The initial plan was for two CDEs to participate to provide the opportunity for some comparison about different teaching styles, plans and expectations. However, one CDE resigned, one was on leave and another became ill and was hospitalised leaving only one CDE to participate in the research with two different groups.

Patients

The inclusion criteria for the people with type 2 diabetes was again those who were English-speaking and recently diagnosed with type 2 diabetes. As people had already been booked into a group education session, a phone call to each person with a brief script describing the research was made by administration staff at the organisation. This was necessary to inform all people in the group education session that

- a researcher would be at the group education session,
- the education session would be video-taped from the back of the room, and
- one person was being sought for an interview before and after the education session.

Each person was also given my contact details and those of the Flinders University Social and Behavioural Ethics Committee if they wanted more information. People who were willing to be interviewed before and after the education session were then contacted by me to clarify the research, the process of the interviews and confirm the time and dates.

In the first group education session there were only 3 patients and 1 partner participant. In the second group education session there was the same CDE and a total of 7 patient participants and 2 partners.

Data Collection

The design for this study was similar to that of Study 1 with the CDE and the person with type 2 diabetes being interviewed before and after the group education session.

The pattern of data gathering sessions is shown in the table below.

Table 3.4. Study 2: Interview and data collection process

	Patient E	Patient F
CDE 3	Interview before	Interview before
	Group education session 1	Group education session 2
	Interview after	Interview after

Note. CDE = credentialed diabetes educator.

The interviews were audio taped, each taking approximately 40 minutes. The education sessions were video-taped and consent of all group participants was gained prior to the session starting. The researcher was present in the group education sessions as it was important to focus the video on the PowerPoint presentation used at times and also to focus on the CDE who may be showing a particular piece of equipment at other times.

Field notes about the group education session were also collected as the group interactions and other participants in the group provided interesting dynamics and anecdotes. Also, the set-up of the group norms occurred in the first hour of the session which was not video-taped.

Semi-Structured Interviews

Group education session CDE interview

The interview schedule for the CDE (see Appendix 10) was also based on that used in Study 1. In addition to the interview questions asked in Study 1, the CDE in Study 2 was also asked:

Question 4: What do you expect the people to know/understand prior to this session?

Question 5: What do you expect the people to know/understand after this session?

Probing questions

As in Study 1, and the first three interview questions, the CDE responses to these questions were probed with general questions like:

- Tell me more about …?
- What did you mean by …?
- Can you give me an example of …?

In Study 2, the CDE was the same participant for the two different groups and there was a time lapse of 3½ months with Christmas in between, providing sufficient time for the CDE to respond to the interview questions in a unique way for the second group education session.

Group education session patient interview

The interview questions for Study 2 were the same as the questions in Study 1 with some minor modifications to accommodate this mode of education. The modifications included asking the patient if they had ever met the diabetes educator before, had they been to any other education sessions and had they had any one-to-one sessions with the diabetes educator (see Appendix 11).

> Question 2: Have you met the diabetes educator before today?
>
> What do you know about the role of the diabetes educator?
>
> What do you think the DE is supposed to do in this session today?
>
> Have you been to any education sessions? If yes, what?
>
> Have you had any individual sessions with the DE? If yes, what for?

The patient was also asked if they already knew anything about blood glucose monitoring as the person with diabetes chooses which topics and group sessions they want to attend.

> Question 5: What do you already know about monitoring your blood glucose level?
>
> How did you learn about that?

The initial questions for the person with diabetes were about their diagnosis and designed to assist them to relax and answer the questions easily, without concerns about having the right answers. The interview schedule for the person with diabetes finished with questions about prior learning, focussing on what they remember and why they think they remember it. The post group education session interview schedule reflected the questions in study 1 with a focus on leanring and understanding after the group educatipn session (see Appendix 12).

Ethical Issues

Modification to the original ethics application was sought for Study 2 from the Flinders University Social and Behavioural Human Ethics Committee due to the changed format of education and reduced interviews. Approval was granted and used by the community based organisation which did not have an ethics committee or approval process for research activities within the organisation.

Limitations

This study was also limited by accessing only one CDE and two people with type 2 diabetes as participants. The access to participants was significantly reduced when staff at the organisation resigned and became ill. These events also resulted in the cancellation of two planned group education sessions on blood glucose monitoring which delayed the opportunity to access suitable education sessions and participants. Also on one occasion a person with diabetes who had agreed to be interviewed declined to participate and attend the group on the day of the session, resulting in an inability to organise an alternative participant at short notice.

The pragmatics of teaching blood glucose monitoring in a group education session to people with different monitors provided its own limitations which will be discussed further in Chapter 6.

Study 3

Procedure

At the end of Study 1 and Study 2 the volume of data collected and transcribed was extensive. However, it only represented the views of three CDEs and six people with diabetes. Given the difficulties finding suitable patients and the need to check if the knowledge and understandings of these three CDEs were widely shared, this further study was developed.

Study 3 was developed to further explore the understandings of diabetes educators about teaching and learning via email interviews. It was not possible to access the patients of these diabetes educators via email without breaching their privacy and confidentiality. Hence, Study 3 did not involve people with type 2 diabetes.

Study 3 was designed to collect more information from CDEs about their knowledge of teaching and learning and their role in education about blood glucose monitoring. An important objective of this study was to increase the number of CDE participants in the research. To achieve this, Study 3 used an email interview technique to access CDEs across Australia. The use of email as an interview technique has been described by Seymour (2001), Bampton and Cowton (2002) and Gordon et al. (2005, 2007). Despite some criticisms around inability to pursue the thinking behind a response, email interviews have developed as “a robust form of data collection” (Reid et al., 2008, p. 48). This study pursued CDE participants thinking by seeking further information about specific responses thus increasing the robust nature of the responses.

A benefit of email interviews as a data collection technique is that they are asynchronous and allow the participant (CDE) to respond to the questions at a time convenient to them. Whilst there are similar limitations to self-report surveys or questionnaires, the email interview offers the opportunity to follow up, clarify or probe the participant’s understanding which is not generally possible from a survey.

Email interviews have one significant advantage in terms of data collection in that they provide an electronic copy of the data immediately which enables data analysis to occur promptly. This is also an advantage in terms of replying and seeking more information from the participant.

To improve my understanding of interviews conducted via email, I contacted Dr Sue Gordon (Senior Lecturer University of Sydney) via email seeking assistance based on her experience using the technique (Dr Sue Gordon, email 2008). I was kindly invited to participate in one of her research projects that used an email interview procedure which also provided me with the opportunity to experience the techniques as a respondent. This was invaluable in developing an understanding of data collection issues such as ‘scroll of death‘ if too many questions are asked, participant selection of a pseudonym, the need for setting the scene or context for the questions and prompt acknowledgement of receipt of responses.

Based on the emerging research around the use of email interviews Study 3 was designed to ask no more than six questions with one or two follow-up emails to probe participant responses. As the questions were based on the those asked in Study 1 and Study 2, the central issues of the thesis and research questions with regard to the CDEs’ understandings about teaching, learning, and their role were maintained.

Participants

Access to a large number of diabetes educators across Australia is best achieved via the Australian Diabetes Educators Association (ADEA). Diabetes educators in Australia are credentialled through the ADEA and in keeping with Studies 1 and 2; credentialed CDEs were recruited for Study 3 via an email invitation from the Australian Diabetes Educators Association (ADEA). Initial responses of interest to participate were received from 45 CDEs via email reply. Of these 45 respondents, one was not eligible (type 1 patients only), five did not respond again to emails, 17 answered first interview questions only, and 22 answered first and second interview questions.

The final 22 participants who responded to both email interviews were predominantly female (21), mostly registered nurses (20) with one pharmacist and one dietitian. The respondents were from New South Wales (8), Queensland (1), South Australia (6), Tasmania (1), Victoria (3), and Western Australia (3).

Semi-Structured Interviews

The email interviews were set around the scenario of teaching a person with type 2 diabetes about blood glucose monitoring on a one-to-one basis, as was the situation in studies 1 and 2. The email commenced with a brief welcome, a request for a pseudonym and then some demographic questions about their primary profession, time taken for teaching blood glucose monitoring, and a check that they met the criteria of teaching people with newly diagnosed type 2 diabetes on a one-to-one basis.

The following scenario was included in the email and set the context for the participants to answer the questions.

> Imagine you are about to run an individual session on blood glucose monitoring (BGM) for a person recently diagnosed with type 2 diabetes.

This was followed by the six questions about the role of the CDE, the role of the person with diabetes, how to teach, how to learn, and important things which the CDE and patient do for effective learning (see Appendix 13). The email interviews were structured initially with the first series of six questions being the same for all participants. The context scenario was reiterated throughout to ensure the respondents remained focussed on the person and context for the questions.

The second series of email questions were semi-structured and designed to pursue the participant's understanding of words, terms or phrases used in their first series of answers (see Appendix 14). Words, terms or phrases about teaching, learning or their role were probed for more detail to unpack the level of understanding about the term or phrase, for example:

> Question 3a: You mentioned that you would "take them through the steps" to teach the person about BGM. Can you tell me more about how this will help the person to learn about BGM?
>
> Question 6a: You also mentioned above that the most important thing the person must do is to "have a good understanding". Can you tell me more about how this will help the person to learn effectively?

Participants were slow to provide responses to the second series of questions. Some apologised for not providing enough detail or clear answers initially. Respondents were reassured that there were no right or wrong answers and that this second email was an opportunity for them to provide more details about teaching, learning and their role, through clarification of a term or phrase they used in their initial answer. Interestingly, some respondents struggled to differentiate between question 1 and question 3 which will be discussed further in Chapter 7.

> Question 1: What is your role in working with this person in this session on BGM?
>
> Question 3: When running an individual session on blood glucose monitoring (BGM) for a recently diagnosed person with type 2 diabetes: Tell me how you will teach the person about BGM.

In addition to these two series of email interview questions, the option for a third email was considered but with the slow responses from participants for the second email interview this was not pursued. It was deemed that while Bampton and Cowton (2002) identified that it was “difficult to know when an interview was reaching its conclusion in the absence of physical cues” (as cited in Reid et al., 2008, p. 48) the lack of responses was a clear indication of the end of the interview.

Ethical Issues

Again, an application for a modification to the original ethics application was sought for Study 3 from the Flinders University Social and Behavioural Human Ethics Committee. Approval was granted and accepted by the ADEA research committee for approval to use the ADEA email system for distribution of the invitations to CDEs to participate in the research. A separate form for consent was attached to the email inviting CDEs to participate. However, emailing responses to the interview questions was also accepted as consent to participate.

Limitations

Study 3 was limited predominantly by providing only the perspective of the CDE in the teaching and learning event that is diabetes education. The absence of the patient’s perspective does not detract from the data collected but limits the analysis to one side of the education interchange.

The number of participants whilst greater than studies 1 and 2 does not provide sufficient data to make any generalisations about the knowledge and understandings of the wider group of CDE professionals in Australia.

Summary of Chapter

Each of the studies in this research evolved over time in response to difficulties experienced recruiting participants. However, the original aim which was to develop an account of the knowledge and perspectives of diabetes educators and patients and to investigate their understandings about the teaching and learning that occurs in diabetes education remained.

The three different studies provided data about one-to-one education sessions, group education sessions and afforded an opportunity to pursue more detailed understandings of CDEs knowledge about teaching, learning and their role in education for self-blood glucose monitoring.

The research design enabled data from both the CDE and patient perspective to be collected and document current diabetes education practice.

The following chapter (Data Preparation) describes the different methods of analysis used for each of the three studies. The findings are reported individually for each study in Chapter 5 6 and 7 (Findings).

CHAPTER 4

DATA PREPARATION

Overview of Chapter

In this chapter the procedures for collecting and recording the data in each of the three studies are quickly reviewed. Then the three frameworks used for analysing the data are detailed with explanations, examples and justifications. Finally the processes used to establish rigour and trustworthiness of the study findings are described in preparation for the following findings chapters.

Data Collection

Data was collected via observations, audiotaped interviews, videotaped education sessions and a review of any related documentation. All data was transcribed and entered into a computer software system (NVivo 7) for analysis.

The semi-structured nature of the interviews allowed the researcher to explore new or different issues as they arose while ensuring the key elements of the research (i.e., the research questions) were being asked and answered. Questions were sequenced in a way to minimise leading the participant and there was opportunity to probe the participants' understandings.

The purpose of audiotaping the interviews was to ensure complete accuracy of the spoken word and to allow the researcher/interviewer to give the participant their full attention. This also enabled independent review of the data for analysis by the supervisors.

The videorecording of the education sessions allowed a review of the teaching session without the researcher needing to be in the room and thus potentially impact the usual CDE education practices. The video review also provided an opportunity to note examples of teaching, learning, teaching approaches and the context of the teaching session which may or may not be mentioned by the CDE or patient.

All data was copied onto compact discs (CDs) and digital video discs (DVDs) initially for ease of transcription, viewing and analysis. All data was then transferred onto secure server systems for secure long-term storage in accordance with Flinders University and NHMRC requirements for ethical research.

Data Analysis

In this study, data was analysed using the NVivo computer software package. This package provides an efficient means of identifying recurrent ideas and themes within a large body of text. This qualitative theme analysis enables the researcher to retain the intent of participants' responses in the context of their responses and in full text format.

Data analysis is about learning and making meaning from these records of information we call the data. Like nursing, it is often referred to as both an art and a science (Behrens & Smith, 1996; Tukey & Wilk, 1986).

Data analysis is aimed at reducing large amounts of information into a summary that is comprehensible without sacrificing the meaning (Behrens & Smith, 1996). Miles and Huberman (1994) "define analysis as consisting of three concurrent flows of activity: data reduction, data display, and conclusion drawing/verification" (p. 10). There are many characteristics of data analysis and the researcher needs to acknowledge their role and influence in the process of analysis.

Some characteristics of data analysis include the

- researcher's pre-conceptions of the phenomenon;
- selection, inclusiveness and mapping of data;
- social nature of the process; and
- need to summarise large amounts of information.

These characteristics lead to a balancing act between precision and richness and ultimately mean that the results of any analysis must be considered provisional and contestable (Behrens & Smith, 1996, pp. 948–949).

Researcher pre-conceptions such as prior knowledge and experiences with the phenomenon, participants, or the venue can influence the construction of meaning in the analysis phase. In this research, the researcher has past experience in observing diabetes education and CDEs at work that has led to concerns about consistently effective diabetes education and a subsequent interest in this area of research. Prior knowledge of the venues, the CDE participants and their views about effective diabetes education program was recognised and independent review processes put in place to reduce any impact during analysis of data.

All data from the CDEs was analysed using two main approaches. The first approach to data analysis was used on both CDE and patient interview data from studies one and two. This initial data analysis was designed to review the whole data set using an interpretive approach to identify themes. This broad analysis of the interview data looked for themes about teaching, learning and the roles of the CDE and patient in diabetes education. These themes were then attached as codes to individual pieces of data and grouped around the research questions. A description of the codes were then discussed with the supervisors to ensure consistency across analysis of all data. This enabled a deeper analysis into each theme, the coded data and the context in which it occurred without being distracted by unrelated data. The NVivo system enables the researcher to make explicit connections between the raw data and the generation of higher themes and ideas. These analysis processes within the NVivo system enabled the researcher to preserve the raw data for re-analysis.

The second analysis was more detailed and used frameworks developed and extended by Danto (1973), Kerr (1981), Shulman (1986a,b, 1987), Grossman (1995), Lawson (1995, 2000), Askell-Williams (2001), and Fenstermacher and Richardson (2005) to set up codes describing teaching and learning actions.

This was designed to provide a fine grade analysis to

- classify the CDE responses using Shulman’s (1986a) and Grossman’s (1995) classification system of teacher’s knowledge,
- code the CDE responses about learner and teacher activity that contribute to active learning (COATSRUAM) (Lawson 2000), and
- rate the quality of the statements made by the CDE about teaching (Lawson et al., 2009).

These three frameworks were used only on the data from CDE statements as they pertain to CDE knowledge and skills in teaching and learning.

Frameworks and Processes Used for Detailed Data Analysis

Classification of Teachers' Knowledge

Shulman's (1986a, 1986b, 1987) classification of teachers' knowledge was used to analyse the data collected in face-to-face and email interviews. Shulman's original list of seven categories with the addition of Grossman's (1995) knowledge of learning category provides a sufficiently broad range of teacher knowledge (Lawson et al., p. 245) for use in the analysis. Table 4.1 outlines the classifications and the definitions used when analysing the data.

Table 4.1. Classification of teachers' knowledge

Classification	Description
1. Content knowledge	**What** to teach, diabetes or BGM content
2. General pedagogical knowledge	**How** to teach
3. Curriculum knowledge	Sequencing (i.e., teaching BGL normal values before teaching BGM technique)
4. Pedagogical content knowledge	Tips and tricks of how to teach the content (BGM)
5. Knowledge of learners and their characteristics	Age, sex, SES, ESL, learning characteristics
6. Knowledge of educational contexts	Context = one-to-one, group, hospital, clinic, home, learning environment
7. Knowledge of educational ends, purposes and values, and their philosophical and historical grounds	Policy, purposes, goals
8. Knowledge of learning	How learners learn

Note. From Shulman (1986a, 1987) and Grossman (1995). BGM = blood glucose monitoring; BGL = blood glucose levels; SES = socio-economic status; ESL = English as a second language.

The COATSRUAM Model

The second framework used for a detailed analysis was designed to code the CDE responses about learner and teacher activity that contribute to active learning. To do this the COATSRUAM model (Lawson, 2000) was used.

Table 4.2. COATSRUAM terms and coding definitions

Term	Description	Coding definitions
Context	Factors affecting learning such as culture, physical environment, teacher, classmates, parents/significant other and nature of tasks to be undertaken.	Factors affecting learning such as culture and language, educator seen as teacher or health professional, physical environment (hot/cold/office/ward), presence of partner/significant other and nature of tasks to be undertaken.
Orientation	Students view learning and problem solving tasks with particular affective orientations derived from the students' past experience with these tasks, out of which they have developed specific views of themselves in relation to these tasks.	Learner view of self as a learner. Learner attributes and characteristics. Includes motivation, confidence, readiness to learn and student anxiety. Learner's view of learning and problem solving derived from the past experience with these tasks, out of which they have developed specific views of themselves in relation to these tasks (e.g., dislike technology).
Analysis	It is through these early analysis activities that we establish a representation, or understanding, of the task.	Analysis of activity to establish a representation or understanding of the task. Pulling information apart. Includes interactivity (e.g., using a piece of equipment) and explaining. Cause and effect. Learning a skill has parts/steps that make up the whole.
Transformation	Encoding activity	The quality of this transforming activity during the encoding process is a major influence of how successful attempts at retrieval will be at a later time. This is changing of the information, reducing, repeating it, adding to it, elaborating it, linking to existing knowledge and developing it.
Storage	The most specific level of organisation here is the feature (f) or proposition, followed by category or concept.	Ways to remember. Organising for storage. Helping student to remember. Includes propositional networks.
Retrieval	The ability to access stored knowledge. We often cannot access something that we know, we know.	The ability to access stored knowledge. Recall. Search. Using cues or hints to recall.
Utilisation	Transfer of learning is really the ultimate aim of our learning (and teaching). Use of knowledge in solving of problems.	Use of general problem-solving strategies if immediate access is not successful.
Attention	Is conceived of as a limited but allocatable mental resource that can be directed by the student towards the demands of the task, or divided between tasks.	Allocation of attention to the task within the demands of cognitive load. Pace.
Management	Effective learning and problem solving is under the control of the learner. It is a managed or self-regulated process insofar as the student plans what is to be done, monitors the effect of that activity and reflects on the extent to which the goal of processing has been achieved.	Metacognitive. Checking, evaluating, revising, reflecting, empowerment.

Note. Adapted from Lawson (1992, 2000 unpublished).

The COATSRUAM model developed by Lawson (2000) is a framework designed to outline and identify the actions involved in learning at a macro level. The model is useful to identify the major components of learning and to consider the implications for teaching. It is not a prescription for specific teaching strategies but is significant in its ability to generate ideas about teaching practice (Lawson, 2000, p. 2). This model was useful in looking at issues which need to be explored in diabetes education to better explain what the person with diabetes may be doing when processing the information provided by the diabetes educator. The framework was used for analysis of the CDE interview data to code examples of teacher and learner activity, in terms of an information processing model, that contribute to active learning.

Rating the Quality of Teaching

The third and final process for analysing the CDE interview data was designed to rate the quality of the statements made by the CDE about teaching. This analysis approach was developed in response to a growing interest in the ability to measure *quality of knowledge about teaching*. A rating system was created to reflect the level of quality of teaching as indicated by statements made by the CDE, building on previous research by Lawson, Askell-Williams and Murray-Harvey (2003) and Lawson, Barnes, White, and Askell-Williams (2015). The focus of this analysis was on the extent to which statements identified explicit learning activity, the implications of teachers' actions for students' motivational, cognitive or metacognitive states, or made any explicit connection to an element of learning as a self-regulated activity.

These attributes of quality teaching were used in the analysis of the CDEs' responses as one method of identifying their knowledge, skills and practices for effective diabetes education. Coding of statements for each of the three analytical scales were checked for inter-rater reliability. Two observers together considered sections of taped sessions to become clear on the interpretation of each code and rating. They then independently coded sections of tape and met to discuss the outcome of their results and to resolve any issues of interpretation by consensus. This consensus was used to create definitions about levels of quality teaching for ongoing data analysis. Once consensus was agreed and a clear and consistent procedure could be identified and used, the tapes were coded for analysis.

The quality of statements made by the CDE were rated as a mechanism to assess the CDEs depth and breadth of knowledge and skills about teaching and learning. It is proposed that the greater the breadth and depth of CDE knowledge and skills in teaching and learning the greater their potential to access this knowledge and skill when needed during an education session, thus increasing the potential to be an effective educator. Definitions and examples of CDE statements and the quality rating scale is provided in table 4.3

Table 4.3. Quality of teaching rating scale.

Code	Definition	Example
1. Statement only	General statements.	The teacher is the expert.
2. Statement + example	Beginning understanding, provides an example but does not provide a justification for how the example influences learning or is linked to learning theory. Statements will usually include "and" followed by the example.	I usually see them again after one week to review their progress and offer advice and support.
3. Statement + justification	Provides a rationale for choice of action, which is more elaborated, gives a purpose for the action/idea. Statements include words like so, because, they should …	Most clients find carbohydrate portions difficult to grasp, so it is very helpful in that regard and it empowers them to self-manage.
4. Statement + justification and link to theory	Higher order thinking, provides a rationale with theoretical foundation and explanation, demonstrates active or deliberate choice of action based on a theory.	

Summary of Chapter

The data collection techniques used provide extensive opportunities for the CDEs and patients to reveal their understandings about teaching, learning and their respective roles within diabetes education. The data analysis frameworks afford a detailed exploration of the statements provided by the CDEs which is evident in the following chapters where the findings for each study are presented.

FINDINGS OVERVIEW—CHAPTERS 5, 6, AND 7

This is an exploratory study about the understandings, knowledge and practices of Australian credentialed diabetes educators (CDEs) and their patients about teaching, learning, and their respective roles in diabetes education.

This research has investigated these understandings of the diabetes educator and the person with diabetes through face-to-face interviews, observations from video recordings of education sessions, and email interviews. The data has been analysed using the Shulman (1986a) and Grossman (1995) knowledge of teaching classification system, the COATSRUAM learning framework (Lawson, 2000), and a 4-point quality of teaching statements rating scale.

The findings from this research are presented in the following three chapters. Chapter 5 presents the findings from Study 1, Chapter 6 presents the findings from Study 2, and Chapter 7 presents the findings from Study 3. In each chapter, the findings of the study are organised in three sections: (a) general comments, (b) CDE understandings, and (c) patient understandings. Within each of these sections, detailed findings are considered under headings related to the research questions:

- What is the understanding of the CDE about their role when teaching BGM?
- What is the understanding of the patient about the CDE role when teaching about BGM?
- What is the understanding of the CDE about the patients' role when learning about BGM?
- What is the understanding of the patient about their role when learning about BGM?
- What understandings do CDEs hold about teaching and learning?
- What understandings do patients hold about teaching and learning?
- What is the quality of the understandings held by CDEs about teaching and learning?

The first section contains *general comments* and describes the participants and the context of the education sessions. For Study 1 (Chapter 5) and Study 2 (Chapter 6), the information generated in field notes and details from video recordings of the education sessions is also included in the general comments.

The second section presents an analysis of the *CDE understandings*. In this section, data from the interviews and observations involving the CDE are treated as a total dataset involving all education sessions with each patient. The total account of the understandings for each CDE includes knowledge accessed and used as a result of interviews about the education sessions with each patient. In this initial study of this topic, the combination of data from sessions with each patient was seen to give a more suitable estimation of the state of the CDE's understandings. Thus, the findings for each CDE are presented in relation to each patient and then as a whole for that CDE.

The CDE understandings are presented using figures which represent the findings generated from the three data analysis frameworks used. Examples from the interviews demonstrate examples of the classifications of teacher knowledge, learner activities, and the quality of the interview statements about teaching and learning. This section also includes data on the understandings of the CDE about teaching, learning and the CDE and patient roles in diabetes education from a general analysis of the interviews.

The third section provides an account of the *patient understandings*. In this last section, the data of the patient understandings as evident from the analysis of their interviews are presented. The findings are grouped into patient understandings about teaching, about learning, and about the CDE and patient roles in diabetes education.

In Study 3 (Chapter 7) the findings will be presented in two sections—*general comments* and *CDE understandings*. This study involved email interviews of CDE's from the Australian Diabetes Educators Association (ADEA) and there were no patient particpants.

In the conclusion of each study findings chapter a brief summary of the study is provided.

CHAPTER 5

FINDINGS: STUDY 1—CDE AND PATIENT ONE-TO-ONE EDUCATION

Introduction

In Study 1, there were 2 credentialed diabetes educators (CDEs) and 4 patient participants. They are referred to respectively as CDEs 1 and 2, and Patients A, B, C, and D.

The findings are presented as four cases of one-to-one diabetes education between a credentialled diabetes educator and a person recently diagnosed with diabetes who was beginning the diabetes education process. For each case, two diabetes education sessions were available for observation and analysis. Data was collected in each case before, during, and after education session 1 (ES1) and education session 2 (ES2) from the CDE and patient as per Table 5.1.

Table 5.1. Study 1: Interview and data collection process

	Case 1: Patient A		**Case 2: Patient B**	
CDE 1	Interview before	Interview before	Interview before	Interview before
	Education session 1	Education session 2	Education session 1	Education session 2
	Interview after	Interview after	Interview after	Interview after
	Case 3: Patient C		**Case 4: Patient D**	
CDE 2	Interview before	Interview before	Interview before	Interview before
	Education session 1	Education session 2	Education session 1	Education session 2
	Interview after	Interview after	Interview after	Interview after

Note. CDE = credentialed diabetes educator.

The findings for Study 1 are presented in two parts with three sections in each part. Part One provides analysis of information from CDE 1 and Patient A (Case 1) and CDE 1 and Patient B (Case 2). Part Two provides analysis of the information from CDE 2 and Patient C (Case 3) and CDE 2 and Patient D (Case 4).

Part One: Cases 1 and 2

General Comments

Case 1

Case 1 involved diabetes education sessions between CDE 1 and Patient A. CDE 1 was an experienced diabetes educator working in a major public hospital diabetes education centre. At the time of the interviews she had been credentialled as a diabetes educator for approximately five years, had provided staff development education on diabetes to registered nurses in the hospital and had completed small-scale diabetes research projects.

Patient A was a 72-year-old woman recently diagnosed with type 2 diabetes. Prior to diagnosis, Patient A attended two of the three half-day group education sessions with her daughter who had also been recently diagnosed with type 2 diabetes. It was at these group education sessions that Patient A was encouraged to be checked for diabetes by her general practitioner (GP). She was subsequently diagnosed with type 2 diabetes and discovered her son also had type 2 diabetes. Her son was diagnosed five years earlier but had not discussed this with the family. Patient A reported that the family did not discuss their diabetes and did not share information about or compare their blood glucose meters or readings.

The interview data reported below was from her first 1:1 education session and during this session she was given her new blood glucose meter and instructed how to use it for the first time.

Prior to the first interview, CDE 1 commented about how nervous she was and that she forgot to order the case notes of the person she was about to see. The patient also commented before the interview that she was very anxious and does not think “she will be able to use the monitor as she is not very good with technology“.

After education session 1 (ES1), both CDE 1 and Patient A were more relaxed and were happy with the education session. The follow-up appointment and interviews were organised for a week later.

During the interview after the first education session CDE 1 was confident that Patient A would be able to monitor her blood glucose levels during the week between the appointments. CDE 1 anticipated that education session 2 (ES2) would involve reviewing the patient's blood glucose levels and discussing other issues related to the care of the monitor and aspects of diabetes management as requested by the patient.

When Patient A arrived at the interview prior to ES2 she was visibly distressed and told me she could not use the monitor successfully and so had no readings. She had tried to use the meter on three separate occasions but the machine told her she had made an error. She did not contact her son or daughter for assistance. She did not contact the diabetes educator or diabetes centre as she believed it was okay to wait until the next appointment. She blamed herself and said, "it is because I'm old and can't learn this new technology*".*

Given this situation when I reviewed the video of Education Session 1 there were two points of interest noted in relation to the difficulty experienced by Patient A. Firstly, during ES1, Patient A requested a pen and paper to make some notes during the session. She was given a hospital glossy pamphlet about BGM and a pencil which did not write on the glossy paper. Patient A did not make any notes. Secondly, each step of the monitoring process was demonstrated and then undertaken by the patient, except for the only step she was unable to do at home independently – placing the strip in the machine correctly. During the week after ES1, Patient A had been inserting the strips in the machine in the wrong way which she reported during the interview prior to the second education session.

In relation to this difficulty, it is also of relevance that in the interview prior to ES1, CDE 1 responded to a question about possible difficulties she was expecting in the education session by saying "she [Patient A] could find that the test strip is difficult to get out of the foil container".

Ironically, as observed on the video of ES1, when Patient A did have difficulties getting the strip out of the foil, CDE 1 assisted her and then put the strip in the meter. This action removed the opportunity for Patient A to resolve her problem of getting the strip out of the foil packaging and omitted the opportunity for CDE 1 to highlight the way in which the strip must be inserted into the machine.

In the interview before ES1, Patient A said that she liked to read as part of her learning. However, during the week after ES1 she was not able to use the instruction booklet or troubleshooting notes in the booklet to work out what was wrong with her machine. As evident by the following quotes from Patient A, she was unable to use the instruction book to work out what she was doing incorrectly.

> Interviewer: Was there anything that XXX gave you to read about monitoring
>
> Patient A: Yes she gave me the book with it and some papers and I read it through but I couldn't sort of work it out.
>
> Interviewer: So when you were having the problems you didn't look at those things.
>
> Patient A: Oh yes but they didn't help. I still have it in my bag but it wouldn't come to me.

It appeared that Patient A had not constructed useful knowledge about the strip insertion procedure in the education session, and could not generate this knowledge from the instruction booklet, and so could not solve her problem with using the meter.

During ES2 the problem with Patient A's technique for inserting the test strip was identified and rectified. "I knew I was doing it wrong but I couldn't work out what and now she has shown me again and I know how to do it" (Patient A, post-ES2 interview).

A significant issue in this high stakes learning was that the patient did not seek assistance until returning for her next appointment a week later and as such did not appear to have fully recognised the importance of blood glucose monitoring. This behaviour suggests that Patient A had not yet taken responsibility for her learning and her diabetes management.

Case 2

In Case 2, the same diabetes educator (CDE 1) was providing education about using a blood glucose meter to Patient B. In this case CDE 1 was less 'excitable' and more reflective in her responses.

Patient B was a 64-year-old man who had previously worked as a computer-science teacher. Patient B had clear ideas about teaching and learning from his role in teaching computer-science at a post-secondary college. He had attended the three half-day group education program and was now attending the 1:1 session to learn how to monitor his blood glucose levels. He was very comfortable with technology and was confident about learning how to use the blood glucose meter.

Patient B had chronic back pain and mentioned that he found sitting for long periods of time difficult. Whilst the educator commented that the chair he was sitting in was not very good, there was no solution offered for more comfortable seating. In the videotape, Patient B was obviously experiencing discomfort but he was not offered an alternative. It is unclear if this discomfort impacted on his learning.

He was successful in learning how to use the blood glucose meter after the first education session. Patient B was able to use the meter to check his BGL, record the level and interpret the result in the context of the time of day, his food intake and level of activity/exercise accurately. This was evident during the ES2 where he discussed his results as recorded in the log book and demonstrated his technique.

CDE 1 Understandings

This section presents the findings from all of the interviews with CDE 1. There were eight interviews in total with CDE 1 as indicated in Table 5.1 above. The eight interview transcripts of CDE 1 were analysed using the Shulman (1986a) and Grossman (1995) teacher classification system, the Lawson (2000) COATSRUAM framework of learning and the 4-point quality rating scale developed in this research. The analyses are presented as figures showing measures of frequency and quality.

The analysis using the Shulman (1986a) and Grossman (1995) teacher classification system and the Lawson (2000) COATSRUAM framework for learning are each represented as measures of frequency. The frequency measure includes each statement related to a category. If a participant made a statement that exemplifies a category this was taken to indicate that this category of knowledge was being accessed during the interviews or sessions. The participant was judged to have considered that category of knowledge, and so was regarded as “having” that category of knowledge about teaching and learning. *Having* in this sense refers to having the knowledge available for use, and to have accessed it, in planning for, and during, the diabetes education episode. It is relevant to note that the judgment that knowledge was available in this research is argued to refer to a state of availability and access that is associated with a level of prompting from the researcher. Such prompted access is still significant and provides a sound basis for giving the participant credit for the category of knowledge. Clearly this does not guarantee that the participant would access and use that knowledge in a particular diabetes education episode, or in a situation when prompting was not available. This procedure for crediting the participant with knowledge of a category might be seen as a “generous” estimate, but this procedure was followed in order to be fair to the participants and to reduce the likelihood that the findings could be seen as an underestimate of the extent of participants’ knowledge about learning and teaching.

The frequency of use of a particular category of knowledge does provide information about the functional use of that knowledge. More frequently used knowledge is seen here as indicating that such knowledge is more readily accessed and this suggests that such knowledge is more likely to be functionally available and to be used during a diabetes education, or problem-solving episode.

The quality rating provides an indication of how rich and complex the patient’s network of knowledge was. This is seen to be a judgement about how powerful that knowledge will be, in Bruner’s (1966) terms, and thus how effectively it can be used to solve the problems that might arise for either the educator or the patient. These findings are presented below.

Teacher Knowledge Classification

The teacher knowledge classification system developed by Shulman (1986a, 1987) identifies seven categories of teacher knowledge. As discussed in Chapter 2 (Literature Review) this classification system with the addition of the Grossman (1995) category of knowledge of learning has been recognised as a “sound basis for representing the range of teacher knowledge” (Lawson et al., 2009).

These categories are abbreviated for ease of use in the following figures (5.1 – 5.4) to the terms indicated in the brackets in the above list of Shulman’s (1986a, 1987) classifications. The figures also include the Grossman (1995) category of “Knowledge of learning” which is abbreviated to (Kn learning). Therefore, the figure represents the analysis of CDE 1 interview data using the combined eight categories.

The figures (5.1 - 5.4) below present the number of statements made by the individual CDE in each category in the interviews before and after the two education sessions, as a percentage of the total number of statements made. Each figure also indicates the Patient (A, B, C or D) involved in the education sessions related to the interviews.

Case 1: CDE 1 and Patient A

Figure 5.1 represents the analysis of the four interviews of CDE 1 with Patient A. In these interviews there were a large number of statements made by CDE 1 (n = 121) and each was categorised in terms of its demonstration of teacher (CDE) knowledge. The numbers represent the statements made in each category as a percentage of the total statements made by CDE 1 in the four interviews about the sessions involving this patient. As such they represent the frequency of use of a particular category of knowledge by CDE 1 during the interviews before and after ES1 and ES2 for Patient A.

Figure 5.1 shows that CDE 1 provided more than one-third of statements (35.5%) which were classified as general pedagogical knowledge (GPK). This suggests a useful level of knowledge about teaching to draw upon in education sessions.

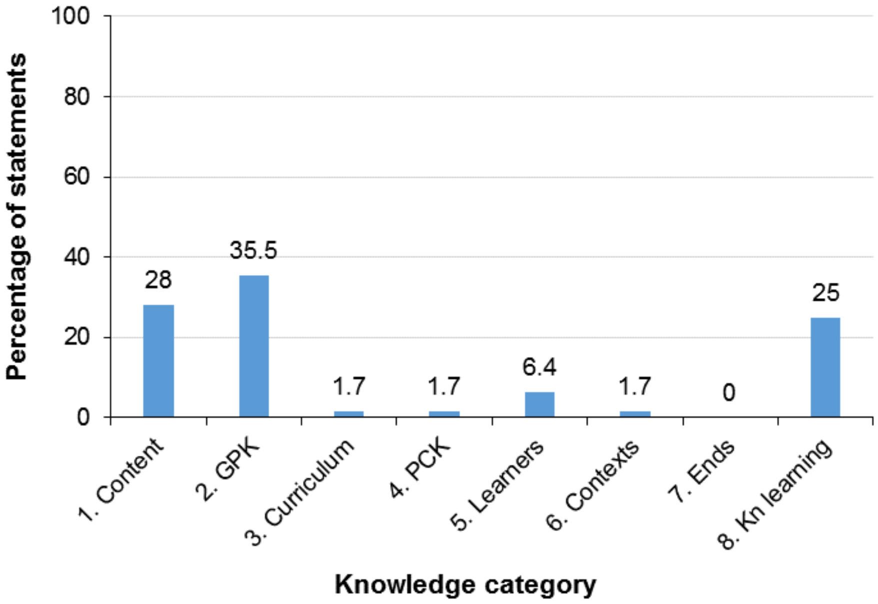


Figure 5.1. Percentage of statements (n = 121) in knowledge categories: Study 1—CDE 1, Patient A.

There was also evidence that CDE 1 had a useful amount of knowledge of learning processes, with a quarter (25%) of statements in this classification. The following quote contains examples of general pedagogical knowledge, knowledge of learning and content knowledge held by CDE 1—with the colour highlighting indicating examples of the different teacher knowledge categories.

> I would be asking her questions about remember that we spoke about blood glucose monitoring and do you understand the reason why we recommend it to see if she can actually recall some of the information which should be something along the lines of it gives her information about her own day to day care, food intake, activity levels so a whole range of things like that because they are stressed in the diabetes information programme, so they are the sorts of things I would be looking at and then I would be wanting to know if she has any remembrance of what sort of figures that she should be looking at to interpret the results that she gets and when she sees a higher level at what point should she be calling others for assistance with that higher or lower depending on if she has been put on any medication.
> (CDE 1, Patient A)

Not surprisingly CDE 1 demonstrated her content knowledge with 28% of statements about the content area of blood glucose monitoring. As seen in the quotes above and below, this content was not directly sought but was used in examples when the CDE answered questions about teaching or her role.

> In this session today I want to achieve basically to teach this lady how to test her blood glucose levels and to interpret the results of her blood glucose levels and obviously I will be asking her whether she is on any medication at this time because at this point in time I don't know. So if she is on, say something, I will be needing to talk to her about the implications say like hypoglycaemia. I don't generally talk about hypoglycaemia in the first monitoring session but if there is a potential for hypoglycaemia I do talk about that as well. (CDE 1, Patient A)

At other times, when CDE 1 was reflecting on the education session, she provided some very specific examples of her content knowledge, for example: “It was perfect it was exactly two hours after she had lunch and it was 7.7”.

Other categories of teacher knowledge were poorly represented in the statements provided during the interviews. This is not unexpected for the categories of curriculum knowledge, knowledge of educational contexts and knowledge of educational ends, purposes and values, given that the interview questions that did not focus on these aspects of CDE knowledge. However, the low frequency of statements about pedagogical content knowledge (PCK) was unexpected because the nature of a diabetes educator role would be to have pedagogical approaches to imparting diabetes (content) knowledge.

In this case, with an elderly woman, CDE 1 acknowledged potential learning issues with technology and the patient’s nervousness. This set of circumstances provides cues to use the PCK “tips and tricks” about using a blood glucose meter in order to reinforce learning and assist the patient’s later recall of important content. An example here could be for the CDE to point out the difference in the two sides of the test strip and note which side the patient needs to be able to see, for it to work in the meter. If the test strip had a distinguishing mark or feature on one side then the CDE might have drawn the patient’s attention to that. If this had been done it would have provided an example of use of PCK by the CDE to facilitate the learning of the patient about the testing procedure.

The last category with a notably low (6.4%) frequency was the CDE knowledge about learner characteristics. Given the nature of the interview questions which focussed on teaching and learning in combination with the characteristics of this patient—a nervous older woman—it was anticipated that more statements about the learner characteristics would be identified.

Case 2: CDE 1 and Patient B

CDE 1 also provided two diabetes education sessions to Patient B. When analysing the interview data it was interesting to note a significant decrease in the number of statements provided by CDE 1 in these interviews before and after the education sessions with Patient B (n = 65). It is possible that CDE 1 was less verbose with this second patient as she was more relaxed having completed one series of interviews and education sessions with Patient A.

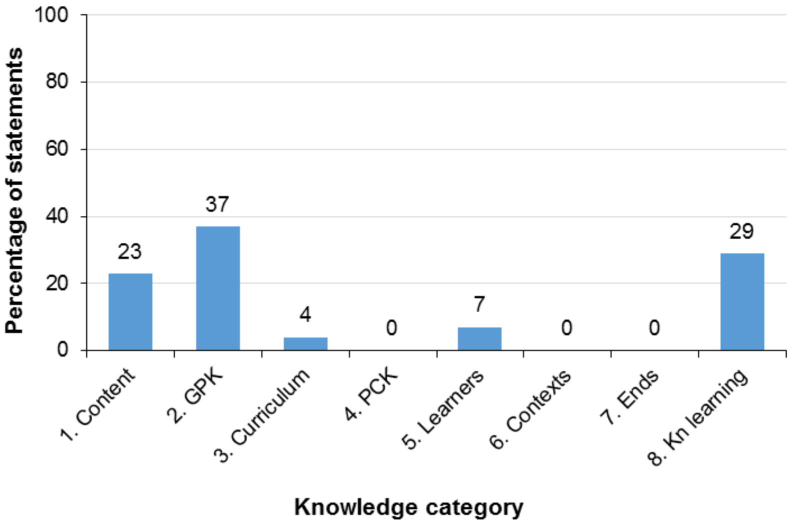


Figure 5.2. Percentage of statements (n = 65) in knowledge categories:
Study 1—CDE1, Patient B

Figure 5.2 shows that CDE 1 again provided statements that were categorised most frequently (37%), as GPK as well as high percentages of content knowledge (23%) and knowledge of learning (29%). Whilst only a small proportion of statements related to learner charcteristics, this was consistent with the frequency of statements in case 1. In case 2, CDE 1 did not provide any examples of pedagogical content knowledge (PCK), knowledge of educational *contexts* and knowledge of educational *ends*, purposes and values, and their philosophical and historical grounds.

In the interviews with CDE 1 in Case 2 the examples of her general pedagogical knowledge were again integrated with the content of the blood glucose monitoring session. That is, CDE 1 did not make many statements about teaching and learning that did not involve examples and descriptions of blood glucose monitoring content as evident in the quote below, as might be expected.

> Just explaining to him and giving him a rationale for it is important, or why my recommendations were for testing two hours after a meal, you need to test before a meal because then he is getting further information. (Study 1, CDE 2, Patient B)

The highlighted sections here were not classified as PCK as they did not meet the definition of “tips and tricks of how to teach BGM” to assist the learner to remember aspects specific to the new knowledge or skill.

In the statement below, CDE 1 identifes examples of general pedagogical knowledge such as *guiding through the steps* and *answering questions.*

> I will be demonstrating to him how we perform blood glucose monitoring. I will then be guiding him through the steps of him doing his own blood glucose monitoring and hopefully answering any questions to the best of my ability that I can that he may have. So it is going to be a session of demonstration and getting him to do the same back to me generally.
> (Study 1, CDE 1, Patient B).

CDE 1 also recognised the importance of learner activity such as asking questions, which is an example of her knowledge of learning (category 8): “Yes he was asking me questions about how does he build up muscle and remove fat so I was saying about exercise” (Study 1, CDE 1, Patient B).

CDE 1 also noted that providing a rationale for information is important in teaching and learning with adults as it aides their understanding in the significance of the activity: “I suppose just explaining to him and giving him a rationale for it is important” (Study 1, CDE 1, Patient B).

There is however, evidence of limited confidence by CDE 1 in the relationship between adults and explanations to aid understanding. CDE 1 goes on further to identify the value of reinforcement but is unsure if it constitutes teaching.

> I suppose it is an example of teaching because sometimes what you say once requires reinforcement, so I was doing it as a reinforcing measure to say just remember that you need to be changing that lancet on a regular basis. I am not so sure whether it is actual teaching but it is reinforcing what I had said previously. (Study 1, CDE 1, Patient B)

This suggests an unclear understanding about the role of reinforcement in teaching, which is discussed later in the section on CDE understandings about teaching. This also demonstrates some of knowledge of learning but it is limited to what to do without specification of how the learner can use reinforcement to learn.

Figure 5.3 is a summary of the classification of the knowledge held by CDE 1 as evidenced by the statements made across the eight interviews before and after education sessions with Patient A and Patient B.

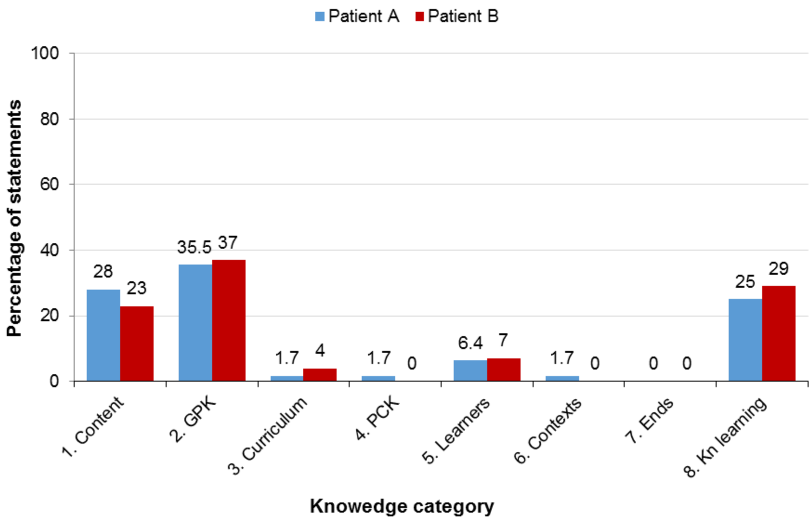


Figure 5.3. Percentage of statements in knowledge categories for CDE1.

Figure 5.3 shows CDE 1 has provided a reasonably consistent profile of knowledge about teaching across the eight interviews as classified using the Shulman (1986a) and Grossman (1995) categories of teacher knowledge classification.

Figure 5.4 includes the outcomes of the analyses of the eight interviews and shows the averages for CDE 1 across the two patients.

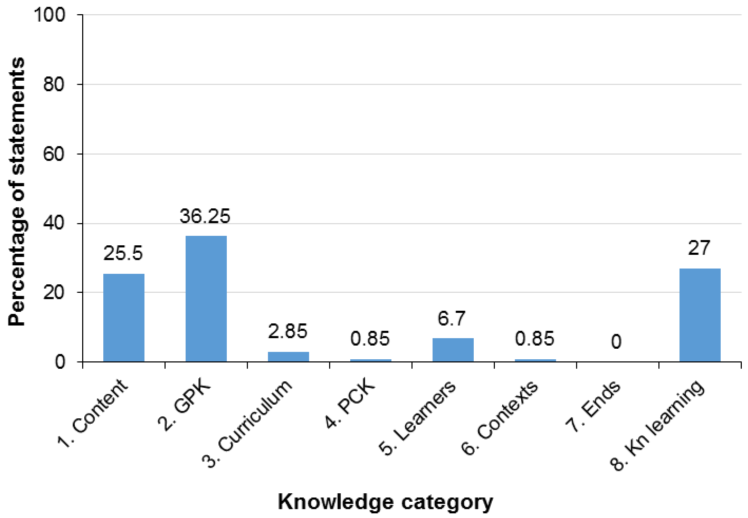


Figure 5.4. Average of combined analysis of CDE 1 statements in knowledge categories.

In Figure 5.4 the total for general pedagogical knowledge (36.25%), learner characteristics (6.7%) and knowledge of learning (27%) is 70%. This suggests that CDE 1 had a reasonable amount of knowledge related to teaching, with about one-third of her statements about teaching concerned with the general nature of teaching and about one-quarter were concerned with the nature of learning processes. This is of particular interest when looking later at the quality of these statements.

A noteworthy finding here is that very few statements made by CDE1 were concerned with pedagogical content knowledge (PCK), knowledge about how to present content in a way that is designed to support learning. So, CDE1 has a store of knowledge about both teaching and learning, though this does not include much PCK.

COATSRUAM—Analysis of Learner Activity

The data collected from the CDE interviews was also analysed in terms of its representation of the CDE's knowledge about activities the patient needs to undertake for learning. This analysis is based on the COATSRUAM model proposed by Lawson (2000), which is a framework designed to identify major classes of processing events involved in learning. The model is useful to identify these major components of learning and to consider their implications for teaching.

Table 5.2. COATSRUAM terms

Category	Description used in analysis
Context	Factors affecting learning such as: culture, physical environment, teacher, partner/significant other.
Orientation	Learner view of self as a learner derived from the past experience with these tasks, out of which they have developed specific views of themselves in relation to these tasks (e.g., dislike technology). Learner attributes and characteristics including motivation, confidence and student anxiety.
Analysis	Analysis of activity to establish a representation, or understanding, of the task. Pulling information apart. Learning a skill has parts or steps that make up the whole. Includes interactivity (such as using a piece of equipment) and explaining.
Transformation	The quality of this transforming activity during the encoding process is a major influence of how successful attempts at retrieval will be at a later time. This is changing of the information, reducing, repeating it, adding to it, elaborating it, linking to existing knowledge and developing it.
Storage	Ways to remember. Organising for storage. Helping the student to remember. Includes propositional networks.
Retrieval	The ability to access stored knowledge. Recall. Using cues or hints to recall.
Utilisation	Transfer of learning is the ultimate aim of our learning and teaching. Practice increases automaticity and thus access to information. Ability to utilise the information in novel ways and situations.
Attention	A limited but allocatable resource that can be directed by the learner towards the demand of the task, or divided between tasks.
Management	Effective learning and problem solving is under the control of the learner. It is managed or self-regulated. Metacognitive. Checking, evaluating, revising, reflecting. Empowerment.

Case 1: CDE 1 and Patient A

Figure 5.5 represents the data from the four interviews of CDE 1 with Patient A. The figure shows each component of learning as a frequency of the total number of statements which reflect the different classes of knowledge of CDE 1 about learner processes. Whilst there were 121 statements in total for the four CDE 1 and Patient A interviews, only 58 statements related to learner processes. The figure below presents the percentage of these 58 statements in each of the COATSRUAM categories.

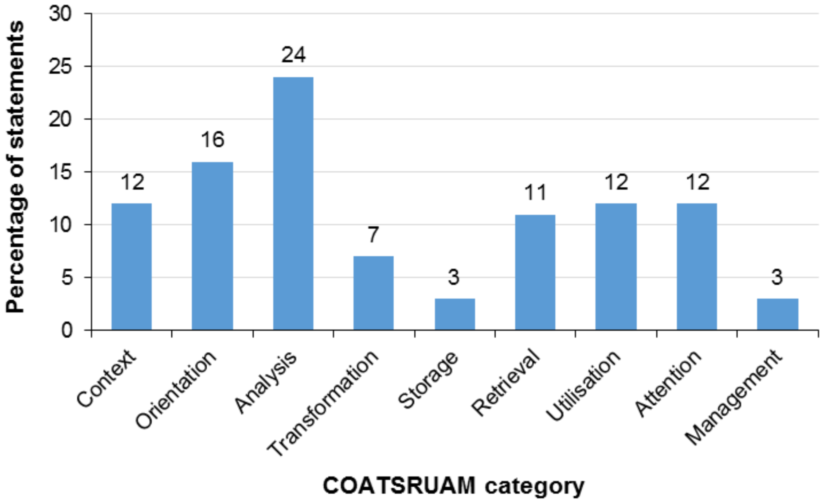


Figure 5.5. Statements (n = 58) in COATSRUAM categories:Study 1—CDE 1, Patient A.

Figure 5.5 highlights that major consideration is given to how the learner would pull the presented information apart, or split it up (analysis); and the learner’s motivational approach to the learning task (orientation).

The emphasis on analysis is not surprising given the focus of the education sessions on blood glucose monitoring which lends itself to discussion of specific separate actions.

CDE 1 has given a moderate level of consideration to the nature of the learning context (context), attentional load and need to concentrate on parts of the content (attention), recall of information (retrieval), and use of the learning beyond the education session (utilisation).

Figure 5.5 also indicates that less consideration was given to the way that newly presented information would be transformed (transformation); how new information would be organised for later use (storage); and how the learning episode could be managed, including the planning for learning and monitoring of the success of the learning (management).

The interview extract below provides examples of the CDE 1 knowledge about context, orientation and analysis. As indicated by the colour coding, CDE 1 provided examples of factors affecting learning such as the physical environment, culture or the task to be undertaken (context); the patients view of learning based on their past learning experiences, emotional orientation and motivation (orientation); and the need to break down the task into its parts for easy representation and mental models (analysis).

> Okay what I like them to do is just to bring out the meter and go through step by step of everything that they are doing when they are testing their blood glucose levels at home and I will ask her to demonstrate preparing her fingers just to make sure that she has all the techniques down correctly, make sure she is applying enough blood to the test strip to ensure that that whole yellow section is completely filled with blood, just going through step by step and by doing that I should actually be able to gauge her competency in being able to perform that task. (Study 1, CDE 1, Patient A)

Figure 5.5 also demonstrates some understandings about the ability of the learner to access their stored knowledge (retrieval) although most of the comments identified the CDE's concern about Patient A's ability to retrieve the information when required, rather than how such retrieval might be cued.

> So hopefully she has remembered those sorts of things, and if there is any discrepancy in her diary we can clarify those things too, so if she is seeing a 15 but not actually thinking that might be a problem that is when we have to go through that information. (Study 1, CDE 1, Patient A)

This was similarly reflected by comments about the transfer of learning or use of the learner's new knowledge beyond the education session (utilisation): "I think she picked up the steps quite well but the proof of that will hopefully happen during the week and next week when she comes in" (Study 1, CDE 1, Patient A).

However, as indicated by the underlining in the following quotation, CDE 1 did demonstrate her understandings of the significance of attention by the learner and the need to consider the attentional, or cognitive, load being imposed during the session (attention).

> I think in that session I probably covered as much as I needed to or felt comfortable with because I knew she was upset to start with so I didn't want to burden her too much even though we did cover quite a bit and once after she had realised what she was doing wrong everything sort of fell into place for her. But I think she can only take small snippets of information at a time, so I have her coming back on Thursday just to make sure she is retaining the information. (Study 1, CDE 1, Patient A)

Case 2: CDE 1 and Patient B

In the data from interviews with CDE 1 surrounding the education sessions for Patient B, there was a similar spread of findings across the nine COATSRUAM categories. However, with Patient B there was an increase in statements about the component of *transformation* of information for learning. This was most likely more prominent in these interviews as Patient B was significantly more confident with the technology used in blood glucose monitoring.

> He was very high in his ability in regards to learning. He was actually able to recite things back to me in a very articulate fashion and I was very impressed with his ability to learn and to do.
> (Study 1, CDE 1, Patient B)

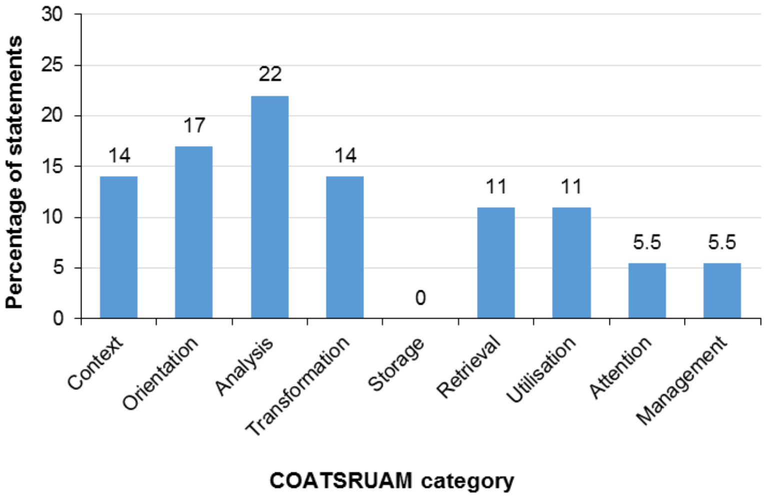


Figure 5.6. Statements (n= 36) in COATSRUAM categories: Study 1—CDE 1, Patient B.

Thus there was more thought by CDE 1 given to how Patient B would be successful at transforming the content during encoding and retrieving at a later time. Also, Patient B prompted CDE 1 to consider examples of where he had obviously transformed the information and was then able to utilise it.

> He can follow instruction very well, he could interpret the information incredibly well. He knew that a few of his levels were a bit high, so he has already spoken to the doctor but he said the doctor is not particularly concerned at this point. (Study 1, CDE 1, Patient B)

This quote suggests that Patient B was engaged and active about his self management of learning about BGM and was able to accurately encode information for transformation and utilisation later. CDE 1 was confident about Patient B's ability to utilise the information after the education session but did not mention anything that could be identified as an explicit understanding about the process of storage, or organisation, of the information: "Everything flowed very easily so I am not anticipating that he will have encountered any problems" (Study 1, CDE 1, Patient B).

In Figure 5.6 there is no frequency for storage from the four interviews with CDE 1 before and after the education sessions with Patient B. However, the pattern for the other categories is similar to the interviews related to Patient A, except for the greater concern with transformation.

This following statement, whilst more a reflection of the information used by CDE 1 to assess the patient's understanding, also shows the network of knowledge the patient needs to link together and if used differently in the education, it could promote the construction of knowledge by the learner. The different use noted here could have included discussion by the CDE of how such a network of knowledge could be presented so that it was apparent to the patient, such as in a map or diagram.

> Are they eating enough for lunch, have they been exercising, what is happening so it is trying to get them to see that if things are happening on a regular occurrence. (Study 1, CDE 1 Patient B)

Figure 5.7 presents the averages from all eight interviews for CDE 1 during the interviews with Patients A and B.

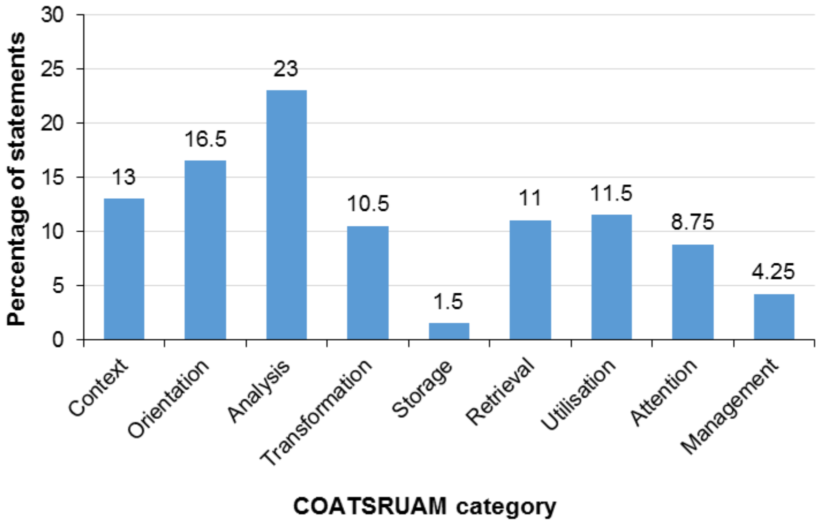


Figure 5.7. Averages of statements in COATSRUAM categories for CDE 1.

The COATSRUAM framework identifies the broad range of events that can be predicted to be influential in a teaching-learning episode. For the student these influences cover the learning episode from its initiation by the teacher to the use of the newly acquired knowledge during problem solving. Each type of event contributes to the outcome of learning.

Although it is not reasonable to argue that there should be an equal distribution of the nine types of events in any teaching–learning episode, there is a reasonable basis for arguing that there should be some activity recorded under each type of learning activity. Low levels of activity therefore raise concerns about the efficacy of the teaching and the likely outcome of the learning.

In the profile shown in Figure 5.7, the very low level for Storage and the very low level for Management activity are issues of concern. In this profile the teacher/CDE has provided very little explicit support for the organisation of new information for later retrieval, such as the linking of the new information to what the patient might already know, or the efficient packaging of the information into a small sized chunk of knowledge. There is also relatively little concern for the management of the learning, for stimulating the patient's checking on the level of the patient's understanding of new concepts and procedures (such as how to insert a test strip into the device).

The lower level of transformation activity is also of concern, for it is this type of activity that influences what the patient encodes of the content being presented in the education session. Ineffectively, or incompletely transformed information is likely to be more difficult to store and so will be likely to be difficult to retrieve when it is needed. We see in the case of Patient A that the incomplete encoding of the test-strip insertion procedure resulted in retrieval failure and thus in ineffective problem solving.

Quality ratings

To rate the quality of the CDE statements a 4-point scale is used as shown in Table 5.3.

Table 5.3. Quality rating scale for credentialed diabetes educator statements.

Rating level	Definition
1. Statement only	Simple, broad or general statements made without any additions or elaborations.
2. Statement + example	An example or technical label is provided in addition to the statement, though no explanation or justification of the statement is provided.
3. Statement + justification	The statement is accompanied by provision of a rationale for choice of action. These more elaborated statements might include a purpose for an action or idea.
4. Statement + justification and link to theory	The statement provides an elaboration that can be linked to some component of theory associated with learning or teaching. A stated rationale or explanation could be linked to some component of theory, or a theoretical basis for an action could be stated.

Figure 5.8 presents the ratings for CDE 1's statements on the 4-point scale in the four interviews associated with Patient A.

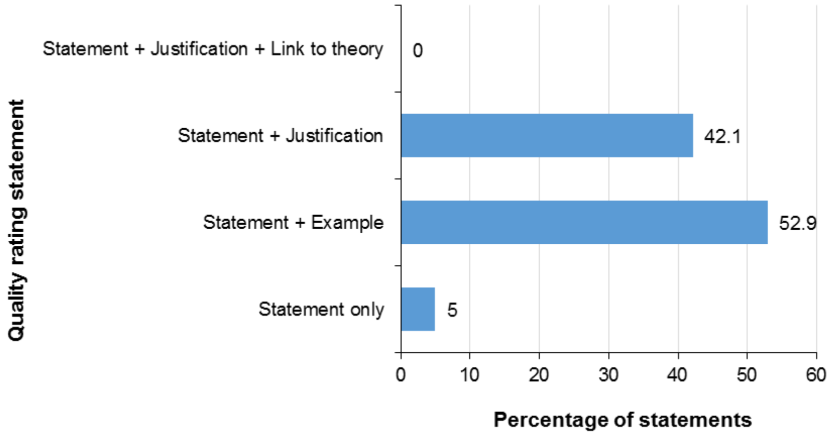


Figure 5.8. Percentages of levels of quality rating of statements provided by CDE 1 in Study 1 in relation to education sessions with Patient A.

As can be seen in Figure 5.8, CDE 1 provided more statements about teaching or learning with an example than those with a justification or link to theory. CDE 1 provided only a small number of statements which were rated as general statements. The following is an example of a level 1, general statement provided by CDE 1.

> At the end of the day I am not telling her what is right or what is wrong I am just guiding. (Study 1, CDE 1, Patient A)

When pursued on this point of "guiding", CDE 1 provided some higher level quality statements by explaining where she was guiding Patient A. This type of statement is considered level 2 as it provides an example.

> Just giving her the information that she is going to be needing to get to where we are wanting her to go which is to actually by the time she leaves here is to feel comfortable and confident about going home and testing her blood glucose levels.
> (Study 1, CDE 1 Patient A)

CDE 1 did however go on to identify that Patient A may have a problem with finger pricking which diverts her away from justifying her previous statement or linking her statement about confidence to any theory of teaching or learning.

> She could have a major issue in regards to pricking her finger and that is sometimes the biggest obstacle to get over, so it could be that we are needing to spend quite a bit of time just going over that. (Study 1, CDE 1, Patient A)

This statement about the issue of finger pricking was coded as a level 3 statement as CDE 1 justifies the need for more time on a topic if the patient has an issue or problem.

In the interview before ES2, CDE 1 talked about the use of the brochures which was an example of how she guides the patient using brochures and then goes on to justify the use of the brochures for later reference by Patient A.

> I will be bringing one of our brochures out and going through all the steps in there and we have some information in regards to that, so just showing her where to find the information and what the recommendations are. (Study 1, CDE 1, Patient A)

This is a level 3 quality statement, but as evident in the video tape of the education session, the CDE did not use the brochure in this way in the first education session and the patient did not use it as a point of reference in between sessions when she was unable to successfully monitor her blood glucose levels.

Later in this same interview before the second education session, CDE 1 had some doubt about how the information wouldl be used and as seen in the quote below was hoping Patient A would know to look at the pamphlet (brochure).

> I have already given her what ideal good control is before meals and 2 hours after meals, and that is written down on the pamphlet. So hopefully she knows that if she is seeing a blood glucose level before meals somewhere between 3-7 she is doing pretty well and two hours after meals as long as it is not going above 11 she is doing pretty well. (Study 1, CDE 1, Patient A)

This snapshot indicates that CDE 1 has the knowledge of how to use resources such as pamphlets but does not report knowledge about strategies or links in her understanding about how to encourage the patient to use the pamphlets. Hence, the quality of the knowledge statements about teaching was mostly at level 2 where an example is provided but there is no justification or theoretical link provided for the teaching action.

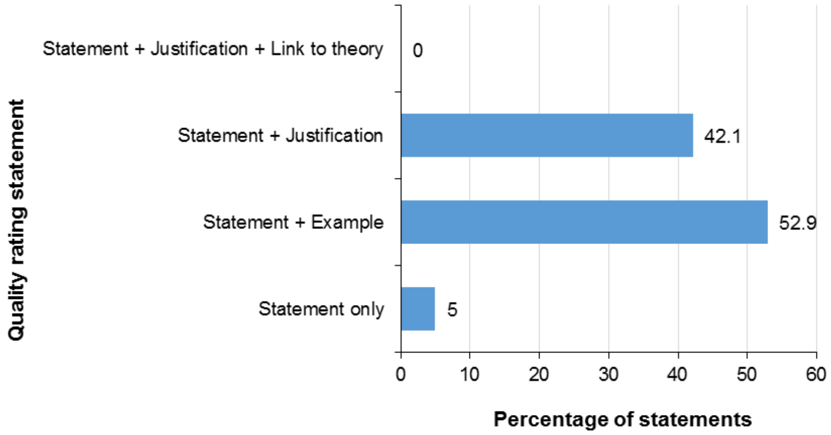


Figure 5.8. Percentages of levels of quality rating of statements provided by CDE 1 in Study 1 in relation to education sessions with Patient A.

Figure 5.9 presents the summary of the ratings associated with the interviews with CDE1 that related to Patient B. We see that CDE 1 has an increased frequency of statements with a justification. However, Figure 5.9 shows that again CDE 1 was unable to provide statements about teaching that were justified and linked to theory, rated at level 4. Whilst there is evidence of statements about teaching which were justified none of these were explicitly linked to theory. The lack of explicit links to any relevant element of theory of teaching or learning, points to a limitation in the quality of the CDE’s knowledge about teaching and learning. The advantage of an explicit element of theory related to some part of teaching or learning is that it provides a useful reference point, or fallback position, for the teacher. Without such a fallback position the CDE 1 is limited in her ability to draw on this knowledge when educating people with diabetes. This inability to access the detail of theory is likely to limit CDE 1’s ability to individualise strategies as necessary in an education session for a patient who presents with unusual learning needs.

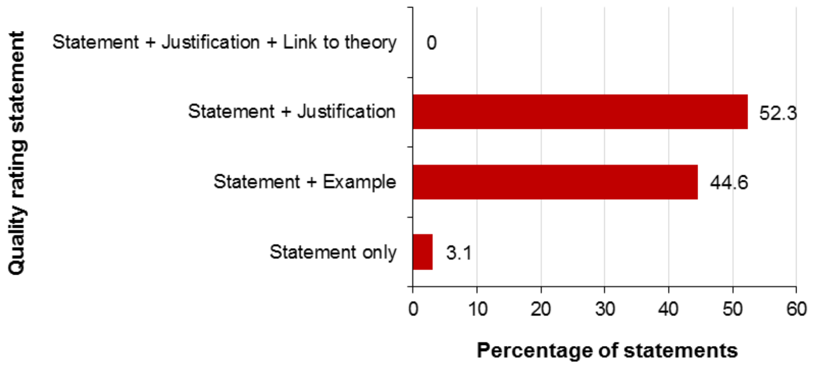


Figure 5.9. Quality rating of statements provided by CDE 1 in Study 1 in relation to education sessions with Patient B.

The following excerpt starts with a statement of general quality but after further questioning, CDE 1 is able to provide an example of teaching "go through the steps" which is considered a level 2 statement. CDE 1 is then able to further add to this with a justification for her actions when she indirectly identifies hearing, reading and repetition as an important part of learning.

> CDE 1: Repetition is important in being able to do something well.
>
> Interviewer: How is it important, why is it important?
>
> CDE 1: I don't really know how to put it into words.
>
> Interviewer: How do you know it is important?
>
> CDE 1: Because from my own personal experience, I know that sometimes on first doing something, I will go through the steps, I might not have clicked with one particular aspect of that. So therefore by hearing about it or reading about it again, I think ah yes I have to do that next time.
> (Study 1, CDE 1, Patient B)

This next statement is rated as a level 1 statement. Whilst it implies understanding and level 2 quality it does not actually provide an example. It is in fact a general statement about teaching.

> I think with all teaching that you have to assess the student and adapt your teaching method to that student or group.
> (Study 1, CDE 1, Patient B)

Figure 5.10 represents the combined analysis of the quality rating scale for CDE 1 from all eight interviews with Patients A and B.

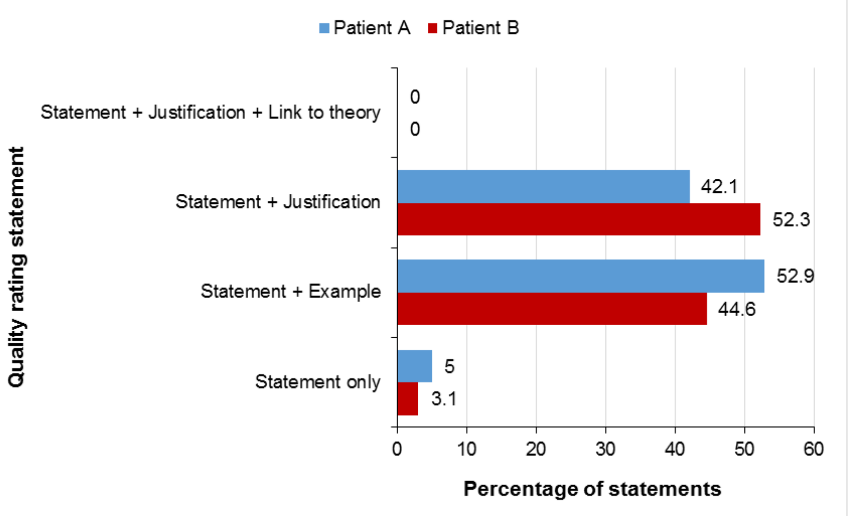


Figure 10: Quality rating of statements provided by CDE 1 in Study 1 in relation to education sessions with Patient A and B.

Figure 5.10 shows a slight increase in the number of level 3 statements which included a justification in Case 2 with Patient B. It is possible that this occurred because CDE 1 was more relaxed and more focussed on thinking about why she did what she did. Also, in Case 2, Patient B was more confident with technology and CDE 1 commented that she had more of a facilitation role. The facilitation role could be seen as a less obvious teaching role and as such may have prompted CDE 1 to provide more justification for her actions.

The analysis in terms of the quality of her statements regarding teaching and learning shows that CDE 1 is most likely to provide an example or justification in her statements. Whilst around half of the statements made by CDE 1 provided a statement of justification, none of the justifications involved a link to theory.

The lack of involvement of theory does constitute a significant limitation. In the dynamic environment of the diabetes education situation, with a wide variety of patients presenting, this analysis suggests that CDE 1 would find it difficult to generate a new strategy or teaching procedure such that she might generate if she went back to consider her coherent, well-developed models of teaching and learning.

The research questions included exploration of the CDE and patient understandings about teaching, learning and each other's role in diabetes education. The transcripts were analysed for these understandings and the findings for CDE 1 in the interviews with Patient A and Patient B are presented below.

Understandings about Teaching, Learning and Roles

The initial analysis of the interviews using NVivo looked for recurring themes. The recurring themes were then grouped under the headings of understandings about teaching, learning and the roles of the diabetes educator and the role of the patient. The understandings about the CDE and patient roles are presented first as they influence the CDE views and beliefs about teaching and learning.

Understandings about the CDE role

CDE 1 was very clear that her role was one of education. She used the term "education" and suggested that the role was obvious. When questioned further she added detail by explaining that it was about educating patients to live with, and manage, their diabetes.

> My role would obviously be to educate her in the best way that I can to help her live her life with diabetes by being able to manage her blood glucose levels and to make sure that she is controlling her diabetes not her diabetes controlling her. (Study 1, CDE 1)

Another example of the CDE understanding about her role as one of education was when she specified the activity of clarifying information. CDE 1 mentioned that her role was about clarifying information for patients because some people have incorrect ideas about diabetes and its management. Specifically she noted the use of *best practice* as important to ensure accurate information was provided for patients.

> Sometimes people come here with preconceived ideas about what diabetes is or the management, whether they have misinterpreted something that somebody else has said or somebody that they know may have diabetes and they do things which may or may be the best way of management, what my role is, is to make sure that I am

> giving her the best practice guidelines that we are meant to be following as diabetes educators so to try and shape her information the best way I can. (Study 1, CDE 1)

The idea of shaping the patient's information was of interest as it suggested an understanding of 'helping the learner to construct their knowledge'. However, when probed on this issue the extent of the CDE understanding was limited to moving the patient's knowledge from the known to the unknown.

> The best way I can was a bit of a funny way of expressing it, I don't necessarily have any specific strategies because you generally need to go with what the information that the patient is providing you as well so trying to shape that patients information from what is currently known to what we know as being a better type of practice if that is the case (Study 1, CDE 1).

CDE 1 also identified her role as recognising the patient's preferred way to learn, which as noted above was not undertaken in the education session with Patient A: "To pick up on cues re patients preferred way to learn" (Study 1, CDE1).

This view of the CDE role also suggests that her view of the patient role is a person who knows how they like to learn and is there to learn.

In the four interviews for Case 2 with Patient B, the CDE reveals some examples of where she develops new understandings about teaching and her role as an educator.

> Well I suppose having the title of diabetes educator yes you are looking more at the teaching role so yes I guess I am a teacher in a way I have never really thought of myself as a teacher, but yeah a different type of teacher a health professional type of teacher rather than an education teacher with regards to school, that is what I was meaning. (Study 1, CDE 1, Patient B)

Interestingly she distinguished between an 'education teacher' and a 'health professional type of teacher', perhaps indicating that her understanding of a teacher was linked to being a school teacher. Despite probing this idea of a health professional type of teacher CDE 1 was unable to differentiate between a school teacher and what she did. Initially she tried to talk about the difference between children and adults and then decided that understanding did not work. She then mentioned that school teachers did more theory whereas she ‘did’ theory and practice.

CDE 1 also pursued a line of thinking about the difference between a school teacher and a diabetes educator as being around ‘giving children information’ but again abandoned this idea as she considered adult learners. She then decided her role was as a teacher, but believed it was different to that of a school teacher, she just could not explain how it was different.

> Well there is a question! Well, assisting people to manage their condition as well as they possibly can by giving them an understanding of what sort of health issues that can be caused through diabetes and other things that they need to be mindful of which can actually impact on their diabetes like problems with blood pressure, cholesterol, high blood glucose levels, whereas a teacher for a school is actually giving I am thinking children but I should also be thinking adult learners information that we know so they are providing a lot of theory in a lot of ways whereas maybe the difference could be and I know it does happen in schools as well but maybe the difference could be is we are trying to give theory but also give practical hands on guidance and I know it happens from both settings just in a different sort of context and I really haven’t answered that question very well.

In the above excerpt it becomes evident that she has some understandings about teaching which is linked to people learning *how to manage their condition*, *giving them an understanding* of the complications or consequences of diabetes and it involves them *being mindful* of these things. However, her understandings were not well developed and thus she was unable to be explicit about her role as a teacher. In the excerpt immediately above she did not discuss what ‘being mindful’ involved, which might have occurred if she had access to a body of knowledge about metacognition. Such a lack of detail in her knowledge of learning and teaching is important because in her work with patients the CDE needs to work with the patient to explicitly link the consequences of diabetes management for the individual to enable them to make informed decisions about their self-management.

Understandings about the patient’s role

Patient A

In the interviews with CDE 1, she identified that patients are often passive at first in the education sessions. She acknowledged that she has a responsibility to change this and develop their role into a more active participant in their diabetes management. This suggests she also believed that as learners they need to be more active and that this is something a patient can learn or be assisted to develop with help from the CDE.

> Usually I suppose they take more of a passive role to start with but part of my role as well is to develop their role and make them an active participant in their diabetes management.
> (Study 1, CDE 1)

However, there was very little detail provided in the interview about how CDE 1 would develop the patient role as a more active learner. As indicated in this next quote, she would be pleased if a patient showed signs of independence or problem solving. But the absence of information about how this could be achieved may suggest she does not know how to assist a patient to become more active. Thus, she would be ‘*pleased*’ if it occurs as it is a desired outcome which the CDE might not know how to achieve.

> Hopefully at least by the end of the second session that I have with her that she will be a lot more active in her ability to be managing her blood glucose monitoring and blood glucose levels. (Study 1, CDE 1)

CDE 1 also showed pleasure at Patient A taking on responsibility for her learning when she said, “I think it was because she was actually happy to take a role”.

When CDE 1 was probed about how she could achieve this independence in the learner and when asked about strategies to achieve a more active independent learner she referred to Patient A as being older and less likely to ask questions: “The elderly patients do sometimes come in with that more passive role as well. And don’t necessarily question as much as maybe they should because they don’t know the questions to question”.

The CDE understandings about her role were limited by her beliefs about individuals and a perspective that diabetes education is about management by health professionals rather than individuals learning to self manage.

Patient B

In Case 2, CDE 1 provided a different understanding of the role of the patient by saying, “to me he is not like a patient and he is not really like a learner, he is more a participant in the activity”. This statement suggests that CDE 1 understood that the typical patient is not normally a participant. This is not congruent with contemporary views of diabetes education with the patient at the centre of the team. It is also not congruent with current views on learning or learners. Contemporary views of teaching and learning would expect the learner to be an active participant in their learning.

When asked why Patient B is more like a participant, CDE 1 noted, “because he is very proactive*”.* The CDE was not aware of Patient B’s prior employment as a teacher and so was pleased with the level of engagement and activity shown by him in the education session. CDE 1 noted that this was not always the case, but she did note that all patients are different: “Sometimes it is really difficult with some people you have to ask them every single question to try and get to the crux of how are you managing, how are you coping”.

In both cases, CDE 1 did not express a view of her role as working at facilitating active engagement and learning by the patient. She was pleased when this occurred and thus values the role of the active learner. However, CDE 1 did not go on to identify how she could influence other patients to actively engage in their learning.

Understandings of Teaching

Patient A

During the interviews, CDE 1 made statements demonstrating her understandings about teaching. Some of these understandings were also identified in the video of the two diabetes education sessions which suggest they were explicit and easily accessed during the education sessions. Not all understandings were evident in actions in the education sessions video, but this could be explained through limited opportunity to demonstrate them rather than inaccessibility to them.

The following comment from CDE 1 referred to doing the hard things first and having a plan in her head.

> Because that is something that they tend to find, because there are quite a few steps I usually go through that part first to try and overcome that hurdle and teach them how to get their hands prepared and ready, so I usually do that first. She [Patient A] could find that the test strip is difficult to get out of the foil container but it is usually the finger pricking device that I find the most challenging.

However, CDE 1 also noted that “plans need to be modified” as you go to ensure the information is delivered at the most appropriate level for the person learning about their diabetes: “I am providing adequate information at a level which is appropriate for their learning needs”.

In the follow-up session for Patient A, the CDE was particular about going through the *steps* of blood glucose monitoring in her teaching and reassured the patient about her ability to “build her confidence*”* again after having been unsuccessful.

> I ensured that she knew which way the test strip was to go in, I went over the steps again and got her to go through the steps with me she did an absolutely perfect job, she told me the steps of preparing her fingers whereas some of them just go straight to the finger, but she knew all the steps she did it perfectly so I knew that she could retain the information. I think it was that because she had someone thing wrong one time and that kicked her confidence. (Study 1, CDE 1)

CDE 1 also noted that it is important to “pick up on cues” of the persons preferred way to learn or simply asking them directly. However, in the four videotaped education sessions, CDE 1 did not directly ask either Patient A or Patient B about their preferred way to learn.

> Finding what their level is of the way they are wanting to learn and sometimes it is even the case of asking them, how do you best learn, do you like to read things or do you prefer to see pictures or do you like practical demonstrations, sometimes you just ask the questions. (Study 1, CDE 1)

CDE 1 stated that giving “written information” is a useful teaching activity and added that it can be used following an education session as both a reminder of information and a trigger for questions.

> When I give them the written information I usually say take it home and have a read and if there is anything you are doing or anything you don't understand when you come back write the questions down and we can go through them then.
> (Study 1, CDE 1)

CDE 1 also identified the value in patients writing their questions down in between education sessions and as questions or issue arise. There were no examples of the specific instruction in the videotape of the education session. However, there was an example of a general instruction to write any questions down for the next session.

These examples of CDE 1's understandings about learning support previous findings that her views were expressed at a very general level and indicate the possible need for CDE 1 to go on to develop specific strategies for use in education sessions with patients like Patient A.

Patient B

For Patient B, there was evidence of a more clear understanding of teaching.

> I will be demonstrating to him how we perform blood glucose monitoring. I will then be guiding him through the steps of him doing his own blood glucose monitoring and hopefully answering any questions to the best of my ability that I can that he may have. So it is going to be a session of demonstration and getting him to do the same back to me generally. (Study 1, CDE 1)

As evident in this quote above, CDE 1 recognised elements of teaching as including demonstrating, guiding, activity comprised of steps, answering questions and having the patient demonstrate the skill back to the CDE.

This increased confidence and ability to articulate her understandings is possibly due to a more relaxed approach to the research process and associated interviews having completed one full case at this time. Also, the CDE had a high level of confidence in the ability of Patient B which may have contributed to her increased confidence and more specific comments about teaching.

> I don't know this gentleman really well I have only met him on one occasion previously however we developed a relatively good rapport so I think hopefully the teaching session should go quite well I think he appears to be quite competent in what his abilities would be.
> (Study 1, CDE 1)

Here we see the CDE being influenced by her rapport with the patient. The understanding of her role limits her education expertise and places significant responsibility on the learner. The demand for explicit teaching was likely greater in the case of Patient A, though discussion of such teaching did not emerge in the interview about Patient B.

Understandings of Learning

Patient A

CDE 1 provided information about her understandings of learning in the interviews before and after the two education sessions with Patient A. This evidence of education practice that demonstrates understandings about learning suggests these understandings are readily available and explicit. CDE 1 has the following understandings about learning:

> Worry and fear prevent learning.
>
> Do things the patient is scared of first.
>
> Elderly [patients] are more likely to be passive learners.
>
> Rapport is important for learning.
>
> Learner more likely to remember what you teach first.
>
> Learner knows own style of learning – therefore should follow their lead re need to write notes etc.
>
> Learning is a little uncertain, therefore the learner not always informed of what is going to happen.

The CDE recognised that fears can interfere with learning and as such should be addressed first. CDE 1 also noted however, that this can limit the amount of information covered in an education session.

> She [Patient A] was very nervous to start with and a little bit hesitant about what was going to be happening. The only problem I found throughout was that I wasn't able to give quite as much information as I would have liked to give simply because of her nerves and she was a little bit overwhelmed and I didn't want to overwhelm her anymore than she was. (Study 1, CDE 1)

In the above quote, CDE 1 has recognised the significance of not overloading the patient with information. When probed she did not provide any further understanding of this point but recognised that there was some sort of limit to how much content she could provide in the session. This would be known more technically as recognition of a limited capacity to process cognitive load and that all learners are limited by what the working memory can process for learning.

The CDE was also aware that whilst labelling a person because of their age is not ideal it does provide a point for consideration when you do not yet know the patient very well: “She [Patient A] is also and this is labelling but she is also an elderly lady and sometimes you find that the elderly patients do sometimes come in with that more passive role as well” (Study 1, CDE 1).

In each of the interviews CDE 1 refers to the importance of rapport with the patient for learning. CDE 1 recognised that rapport assists the learner to feel comfortable and thus more able to learn. CDE 1 also notes that the environment and time with the patient affects the ability and opportunity to *build up a* rapport.

> CDE 1: We haven’t really built-up that proper rapport because even though she was here last week we weren’t in an environment to develop a proper rapport.
>
> Interviewer: How does having the proper rapport help them to learn?
>
> CDE 1: They know how they can relate to you and the sort of approach that you take generally trying to make them become more comfortable with you as much as is feasible.

CDE 1 made statements about teaching scary aspects first to reduce worry and anxiety but also that patients will remember what they were taught first. CDE 1 also checks patient recall through asking about previous sessions and the items taught first in the past session.

> I would be asking her [Patient A] questions about remembering that we spoke about blood glucose monitoring and do you understand the reason why we recommend it to see if she can actually recall some of the information.

A significant issue for Patient A was the inability to monitor and problem solve when she was at home in between the two education sessions. CDE 1 acknowledged that in the first education session Patient A asked for a pen and paper to write down notes for herself as this is how she knows she learns best. On reflection, CDE 1 identified that whilst she gave her a pamphlet and pencil, she did not encourage Patient A to make her own notes and should have done so given the patient identified this as a need for her learning.

> She kept saying I want to write it down and I gave her the opportunity to write it down at one stage but she didn't but she said if you go over it and do it again I will be able to remember it but I should have just got her writing down from the beginning because I think that may have helped her a little bit because that is obviously the way she likes to learn and I didn't really at first accommodate that as well as I should have. (Study 1, CDE 1)

What CDE 1 did not realise was the reason Patient A did not write notes was that the pencil would not write on the glossy paper of the pamphlet.

This last understanding below highlights that the control or driving of the education session often remains with the diabetes educator. The patient often attends a session without a clear understanding of the content or purpose which can affect their confidence and ultimately their learning.

> She [Patient A] was happy to take part in what was being done, she also had a bit of a sense of insecurity about what she was going to be learning which can actually also be part of the role of being a learner or student, not feeling confident or competent in the task at hand. (Study 1, CDE 1)

CDE 1 has demonstrated in the statement above that the self efficacy of the learner influences their learning and the outcome. When this idea was pursued she did not offer any further understanding of the role of self efficacy in learning. She did however continue to note its importance without explanation of why it is important.

CDE 1 again demonstrated her limited understandings about some of the technical aspects of learning and her role in learning. In these examples we see her limited understandings of working memory and self efficacy and she as the CDE could influence the learners self belief and thus motivation to learn and achieve her diabetes management goals.

Patient B

CDE 1 provided more insight into her differentiation about learning when discussing Patient B and his role. Having described him as more of a participant than a learner, CDE 1 was asked what Patient B would do if he was more of a patient or a learner: “Maybe he would be wanting to be spoon fed more, possibly not showing the ability of being able to do or follow the instruction as well. That sounds terrible doesn’t it to say that”.

Whilst she was concerned at her description of the dependent learner, this understanding was one of the views or beliefs she holds about learning and learners. CDE 1 further explained this understanding by identifying that the learner also contributes to the learning experience. However, as seen in the statement below CDE 1 believed that the learner is a recipient of information and suggested it is their responsibility to expand their understanding.

> They are learners, they are coming to learn and hopefully broaden and expand their understanding of a given topic. But by the end of it feel that they can actually contribute what they have learnt and their experiences which they have brought with them as well. They are also contributors to the learning experience.
> (Study 1, CDE 1, Patient B)

When the CDE’s understanding about the contribution of the learner was pursued she suggested it was from their own experiences or knowledge about diabetes which they bring to the education session.

> With their own prior experiences, it could be that this gentleman may say yes I am worried about high blood glucose levels because my aunty had very high blood glucose levels and had her leg amputated and things like that, so they are contributing their own personal experience and other things they have heard of or learnt about before. (Study 1, CDE 1, Patient B)

Again, there appears to be an understanding that learners need to construct their own knowledge from what they are taught, but CDE 1 does not appear to have an understanding of how this happens, and how the learner might construct this knowledge.

Ideally, CDE 1 would use the information provided by the patient to connect the new information they are learning about diabetes to these past experiences and knowledge, thus strengthening their storage and recall ability. In addition to this, family history can provide an opportunity to explore their concerns and misunderstandings about diabetes management which could negatively influence their self management.

Patient Understandings

In Study 1, patients were interviewed before and after their individual education sessions. The interview transcripts were not analysed using the teacher knowledge classification systems, learner processes identified in COATRSUAM or quality of their statements about teaching and learning because they are not expected to have this level of formal education knowledge and skills as patients. Instead, these interviews were examined for examples of their understandings about teaching, learning, their role and the role of the CDE in the education sessions and beyond. The section below provides examples of their understandings.

Patient A

Patient A was a 72-year-old woman who was nervous about blood glucose monitoring as she had no understanding of what it was and had not previously seen anyone monitor their blood glucose levels. Whilst she has a son and a daughter with type 2 diabetes, they do not talk about their diabetes or their monitoring. She was not able to use the blood glucose meter at home independently after the first education session.

Understandings about the CDE role

Patient A was very happy with CDE 1 and glowing about what she did.

> They [sic] explain everything to me, that is the main thing because I don't know nothing about it.
>
> To explain everything to us, show us how to do it. I think they are very very helpful and [CDE 1] has been.
>
> She explains it a lot, she goes through every one of them and then she asks you questions and then you know what she is talking about.

When asked about the role of the educator, Patient A was definite that the CDE was a dietitian. It was interesting that Patient A had met the educator at a group session but also noted that the dietitian did not attend the group education session.

Interviewer: Would you say or do you know if they are dietitians or nurses or just people who happen to know about diabetes.

Patient A: She [CDE 1] explains everything to you about it. That is what I like about her.

Interviewer: Do you know if she is a doctor or a nurse or a dietitian?

Patient A: No she is a dietitian.

Interviewer: Are they all dietitians?

Patient A: That is the only one I have seen is [CDE 1].

Interviewer: Does it make any difference?

Patient A: It helps.

Patient A also thought the educator could be a nurse or a doctor but not a teacher or physio. Of interest in this context of teaching and learning is that she did not think the diabetes educator could be a school teacher because she did not think they would know how to teach about diabetes.

Interviewer: What if we had a teacher maybe a high school teacher teaching about diabetes?

Patient A: I don’t think they would know how to. I think you need a dietitian.

Interviewer: What about a nurse?

Patient A: They could explain a few things but not the same as the dietitian can.

Interviewer: What about a doctor?

Patient A: They could because they should know a fair bit about it.

Interviewer: What about a physio?

Patient A: I don’t think so.

This suggests that Patient A believes that the diabetes educator needs to be a content expert and not just a teacher.

Understandings about the patient role

Patient A did not provide many statements about her role in the diabetes education sessions other than to identify a traditional role of listening and doing what she was told, with some follow up reading homework.

> To listen and do what she tells us to do.
>
> It does help because I listen to it all and then I go home and read what she has given me to read and I pick it all up that way.

Whilst the detail provided about her role was limited, there is evidence of her very general understandings about her role as a learner from the statements she made about teaching and learning. These are featured in the sections below.

Understandings of teaching

In the interviews before and after each of the education sessions, Patient A was initially reluctant to answer questions about teaching. However, when asked about a hobby or skill she has taught another person she was quick to share her experiences about teaching her grandchildren to knit. From this discussion it became evident that her understandings about teaching involved

- demonstrations,
- observing repeated practice,
- information provision, and
- practicing.

The following are examples of statements made by Patient A reflecting these understandings:

> I taught my great grandchildren how to knit and they sit next to me and then I do it and then I hand it over to them to do because I always say when you knit you go in over through, out and they watch me do it and then they try and do it. That is how I teach them how to do it.
>
> Two or three times I say it to the children and they know it and it is the same with me now, I have to be told a couple of times.
>
> She goes over it quite a few times, she tells you two or three times.

When discussing her understandings of teaching, Patient A provided more information about learning than teaching.

Understandings of learning

When asked about learning, Patient A identified activities such as watching, listening, reading and writing notes as the main ways in which she liked to learn. As evident in the excerpts below from the interviews with Patient A, she was clear about how she learns best and how each technique benefits her.

> By listening to her and watching what she is doing.
>
> By seeing it you seem to grasp it better.
>
> From watching them. Or reading it out of a book. I can follow a book on how to do it.
>
> I can read the pamphlet but sometimes it doesn't come through the same way as when you have already been told it and then write it down, to remind you later.

When asked about what she would tell her daughter about her education session she replied:

> I will tell her everything I learnt now because I know just about everything, I learnt a lot today. I really have learnt a lot today. By doing it you seem to learn more than just by looking on.

This indicated a high degree of confidence and also a pointer to learning through doing as well as watching. This confidence was in fact unfounded as Patient A was not able to monitor her blood glucose levels at home. The earlier statements about how she learns best did indicate her preferred ways of seeing, listening, doing and taking notes. However, as identified in the general discussion of this case, Patient A did not take her own notes and did not do all elements of the monitoring process. As noted earlier, the fact that information on the specific strip insertion procedure was not explicitly focussed on in the education session suggests that her belief in the importance of 'doing' is justified.

Patient B

Patient B was a 64-year-old man who had previously worked as a computer science teacher. He was confident with the technology and was successful in monitoring his blood glucose levels at home after the first education session.

Understandings about the CDE role

The following excerpt of the pre-education session 1 interview with Patient B who has experience as a teacher in computer science at a post-secondary college demonstrated a very clear view of the role of the CDE and the difference between a teacher and a facilitator. He also identified different types of knowledge when he described ‘real practical knowledge’ as the knowledge that was useful. He also associated this type of knowledge with the role of a facilitator such as the CDE.

> Interviewer: Do you think the diabetes educator is a teacher?
>
> Patient B: Well that is what educator means. Or a facilitator.
>
> Interviewer: That is a good word isn’t it. What do you think facilitator means to you?
>
> Patient B: A facilitator is sort of like a medium, between two things. In this case it is the medium between not knowing and knowing.
>
> Interviewer: How is that different to a teacher?
>
> Patient B: A teacher usually has their own goals for their own purpose. If you take a teacher in school then there goal is to get results, theoretical results if you like. Which may not be practical results. Just because a person passes an exam they might be at a set level of knowledge doesn’t necessarily mean that they actually have achieved real practical knowledge.
>
> Interviewer: So in this situation with the educator would they be a teacher?
>
> Patient B: I don’t think so, I don’t think they should be, I don’t think that is the role.
>
> Interviewer: So you would think they are more of a facilitator?
>
> Patient B: Yes.

In the statements above, Patient B also differentiated his ideas of a facilitator and a teacher through the notion of goal setting. Patient B suggested that a teacher sets particular types of goals that might not be appropriate for a CDE. This understanding of the role of the CDE was pursued and Patient B went on to describe and distinguish between his understanding of a teacher and a facilitator: “A theory bound teacher/lecturer/educator is the sort of person you find in a pure university, where the students are all, become involved in research and that type of thing”.

Patient B also noted that ultimately, people with diabetes will have to learn to manage their condition for themselves, so the role of the CDE was to teach the patient the skills to do this.

Interviewer:	When you come and see the diabetes educator what do you think they are supposed to do?
Patient B:	I think people need to learn the skills to manage their own situation. That is what it really amounts too.
Interviewer:	So what they are trying to do is to teach you those skills?
Patient B:	Well I mean a patient can’t be dependent upon somebody else to tell them what to do all the time, they have to learn for themselves.

Patient B also identified that the ability to answer questions was an important part of the role of the CDE:

> I think the ability to be able to answer questions is important. You find a lot of educators or facilitators whatever you want to call them have again by rote they have this spiel, but if they are taken off that track they are just as lost the person they are trying to teach, so they have to have the ability to vary and adjust.

This idea of the CDE role as a facilitator held by Patient B was also closely tied to his understandings about teaching and learning which have an applied and practical focus.

> I think I said last time that facilitation is a good word, it is a complex word but an educator to some people may seem too formal or teacher or what have you maybe even facilitator is not the right word either. To me it is better.

Understandings about the patient role

Patient B had a well developed understanding about the role of the patient in diabetes education. He recognised that the person with diabetes lives with it 24 hours a day and must take responsibility for managing their diabetes: “Well I mean a patient can’t be dependent upon somebody else to tell them what to do all the time they have to learn for themselves”.

Patient B saw the role of the patient as taking responsibility for the learning and applying to their own situation: “I think people need to learn the skills to manage their own situation, that is what it really amounts too”.

The understanding of Patient B about his role was evident in the video of the education session and further supported by the following comment made by CDE 1 after the education session: “Well if anything I suppose my input in the session like we just had is less intense, because he is actually forthcoming with the information, forthcoming with questions”.

In this above statement the CDE provides an example of how Patient B behaved in the education session which is also an example congruent with what Patient B identified as his understanding about his role. Patient B identified that part of his role was to be active and participate through providing information and asking questions.

> It needs to be correlated to the events that are happening during the day I guess. I partly understand about the rise in insulin after food intake and all that sort of thing but I am not sure what the correlation between that and exercise is, so if a person is sedentary during the day is that going to be different to a person who does a lot of activity during the day. I need to find out just how to interpret the results.

In his discussion of exercise, Patient B showed how he was making connections between ideas presented in the education session and how he was constructing his knowledge around interpretation of blood glucose levels. He was engaged with the content and taking responsibility for his learning.

Understandings of teaching

Patient B has a clear preference for practical teaching which appears to be driven by his own teaching experience in computer science: “They [previous employer] felt they were better off with people who had the technical skill and knowledge to impart in a more practical way”.

Whilst he recognises the value of theory and how it is needed for an information base for a practical activity he also noted the need for theory before a demonstration.

> Demonstration but that would probably be precursed [sic] by the theory. (Study 1, Patient B)

A further example of where he talks with some disapproval for theory-based teaching and clearly values practical and applied techniques such as demonstrations.

> I suppose in one way it is the same difference between pure maths and applied maths. Pure maths has to my mind anyway no real end purpose other than the pure mathematics itself, whereas applied mathematics is always looking for a practical answer to a problem or solution. (Study 1, Patient B)

He also values teaching in an equal partnership and recognises that all participants in a teaching and learning event can contribute and benefit.

> I was quite prepared to see that a student may have much more knowledge in particular areas than what I had and I was interested in what they had to say or how their approach was rather than setting out strict guidelines of how people should think, I think that is a wrong way to go about things. (Patient B)

In summary, Patient B had an understanding of teaching which appears to have developed through his work experiences. Whilst, he did not articulate a very detailed understanding about teaching, his understandings were focussed around teaching being practical, involving demonstration, imparting knowledge for practical solutions to problems rather than a theory bound approach to teaching.

Understandings of learning

Patient B has a developed understanding about learning from his time as a computer science teacher. His understandings about learning are driven by practice and learning through demonstration. He is a ‘hands on’ learner and values a practical approach to teaching: “It depends on what you are being taught but practical demonstration and practical application to me is more important than a load of theory”.

Patient B does go on to acknowledge that in fact he always likes learning through practical applications as he views himself as a practical person: “I guess I am a practical person, so I like to see practical applications”.

When the idea of being a practical person was pursued in the post education session interview 1 a slight variation on the idea evolved. Patient B went on to acknowledge that he likes to learn in stages and suggests this is called a ‘bottom up’ approach in his technical background: “I am a stage by stage person. In our technical term we call it bottom up”.

As is evident in the extract below, Patient B had a view of learning that incorporated goal setting and then starting at the bottom of this goal and working up towards it.

Patient B: It is like people writing computer programmes there are different logical ways of doing things, my way is start at the bottom know what your goal is clearly.

Interviewer: Does the learner need to know what the goal is?

Patient B: Both. It is no good having two different goals.

Interviewer: Is that just a matter of telling you, say you are the learner today is that a matter of the educator telling you what the goal is?

Patient B: That is a start.

Interviewer: So that is what you hope they do, give you some idea of what they hope to achieve today so you know where you are heading?

Patient B: That is the other way around because then the educator is taking more of a top down approach because they are looking at the end result first, what they need to achieve and you need to achieve, then you start at the bottom and work up.

Interviewer: So the goal is the end point and then you start at the bottom and work your way up to that?

Patient B: Yes.

In the statements below, Patient B identifies the benefits of using a video but in turn acknowledges the importance of attention for the learner.

Patient B:	The sound of a lecturer’s voice only can get awful boring after a while but this will break up a session which then helps the discussion in the group breaks up.
Interviewer:	Do you know why breaking up a session is helpful?
Patient B:	Well it is all to do with concentration and the ability of being able to take it in, and probably in this particular case when you have people with diabetes who are suffering possibly from attention span disorder, you are a bit lethargic and you may not be able to keep on that one thing for too long.

Here Patient B noted that breaking up the session assists the learner to pay attention and implies that there is a limit to how much new information the learner can “take in”. He also set out his view about what constituted true understanding:

> Learning is the gaining of knowledge but it entails much more than just the knowledge, it is to do with the understanding of the implications of the knowledge what to do with it, how to apply it the list goes on and on. It is no good having the knowledge without knowing what the knowledge means or how to use it. It is a bit like a couple of kids I went to school with who could learn Banjo Patterson’s Man from Snowy River and recite it word for word but they couldn’t explain to you what it was all about, they rote learnt it. (Study 1, Patient B)

In further elaborations on his view of learning, Patient B identified that he does not like rote learning and needs to understand what he is learning. In this explanation he went on to identify the need for time to think about the content as important for him to learn for understanding and application: “I could never do it. I could do it but I couldn’t recite it straight away I had to think about it and by the time I had thought about it the time was up”.

Summary

It is important to draw attention to the wide variation in the understandings about learning and teaching held by these two patients. This variation is of significance because it shows the different situations that a CDE is likely to experience and prepare for in the education sessions.

The actions of CDE 1 with Patient A needed to be different than those with Patient B. Patient B needed less scaffolding as he saw that he needed to be more active, and was more active, such as with his questioning. The demands for scaffolding of learning made on CDE 1 by Patient A were much greater if that patient was to gain an effective level of understanding.

Part Two: Cases 3 and 4

General Comments

Case 3

In Case 3, a different diabetes educator (CDE 2) was providing individual education about using a blood glucose meter to Patient C.

CDE 2 was an experienced registered nurse and had been in diabetes education for approximately three years. CDE 2 identified a preference for working in primary health care and community health rather than in the acute care setting of the hospital. She was a mature woman who is also bilingual. CDE 2 was recently credentialled and an avid reader of research and information about diabetes education and management. She did not feel confident in her knowledge and skills but was very keen to participate and receive feedback about her role. She specifically requested to have access to the video-tapes as a means of reviewing her education session for professional development purposes.

Patient C was a 53-year-old man who was an electrical tradesman but had moved into work in an office. He was comfortable with technology and gadgets and had previously taught apprentices. He presented as very confident about learning to use a blood glucose meter. He had attended three morning group education sessions and a one-to-one (1:1) education session with a dietitian. He was now attending the 1:1 session with CDE 2 to learn how to monitor his blood glucose levels.

Patient C was successful in monitoring his blood glucose levels between the two education sessions for this study. There was one month between the two education sessions. He reported managing well and feeling very confident about this procedure.

Case 4

In Case 4, the 1:1 education session on blood glucose monitoring was provided by CDE 2 for Patient D. Patient D was a man in his late 50s who had only recently decided to learn about how to manage his diabetes, which he had had for some time. Essentially he was a newly diagnosed patient.

Patient D was known to CDE 2 and she commented that he had a history of heavy alcohol consumption in the past. The father of Patient D had recently died and CDE 2 was aware of the potential for him to be grieving and be distracted from the focus of the education session. Patient D ordered a new blood glucose meter and it had been delivered set ready to use, however, he had not used it prior to the education session.

Patient D was successful in using the blood glucose meter after the first education session.

CDE 2 Understandings

Teacher Knowledge Classification

Case 3

CDE 2 scored similarly to CDE 1 in the teacher classification categories of general pedagogical knowledge (GPK) and knowledge of learning (Kn learning). However, she also provided statements which are evidence of the other categories which suggests access to a broader range of knowledge about teaching and learning. The profile for Case 3 is shown in Figure 5.11.

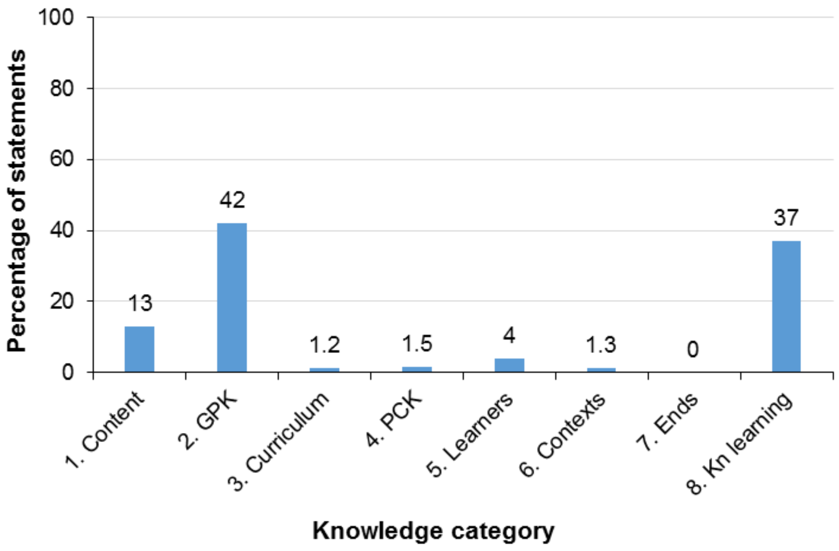


Figure 5.11. Percentage of statements (n = 88) in knowledge categories: CDE 2, Patient C.

Analysis of the statements made by CDE 2 during interviews with Patient C provided high frequency of general pedagogical knowledge (GPK) and knowledge of learning. Examples of GPK statements are:

> Some people are really technical, so they are very comfortable so you don't have to labour the point whereas other people are less familiar with the technical things, they are a bit technophobic so you relate it back to something that they are familiar with operating so that is the starting ground, the base ground.
>
> Showing pictures actually having the equipment available and they play with it, demonstrating and getting the person to repeat some of the skills.

This next extract is both an example of a GPK statement and moves on to show the CDE's knowledge of learning.

> For example if he had an error message on his machine, if I had been clear enough in our earlier discussion he would know that there was a list of error messages in the manual and he could go back to that and follow those instructions to fix the problem.
> (CDE 2, Patient C)

Further examples of CDE 2's knowledge of learning is evident in the following three statements.

> It (repeating) is a way of them being able to apply what they have just seen and learned, they go away knowing that they have actually remembered the sequence of steps involved in that activity, you don't tend to take everything in, in one go.
>
> Sometimes people get very nervous whether it is being anxious that somebody is looking at them or not so just nervousness and fumbling and not being able to repeat the skill that has been clearly demonstrated and so not being able to do it after the first time.
>
> It needs to be a fairly meaningful happy interaction so that they feel comfortable coming back and getting help or support.

The analysis showed moderate frequency of statements reflecting the content knowledge of CDE 2. Examples of these statements are:

> Showing how to put a lancet in and load it and cover it and then they repeat that.

> Thinking about what medication they might be on, their current blood glucose control, whether they are fearful of pricking themselves or not.
>
> How he has implemented the lifestyle factors, the exercise, the dietary changes and whether he needs when he goes back to his GP for an HBA1C test whether it will reflect that he does need some adjustments to his medication.

The analysis identified low frequency of statements about Curriculum Knowledge, Pedagogical Content Knowledge (PCK), Learner Characteristics and Knowledge of Educational Contexts. The classification of Knowledge of Educational Ends was not evident in the statements made by CDE 2, which is not surprising given the interview questions.

> I tend to break it up into little blocks and I show something and then ask them to do it, mainly with the lancing device, …… and turning the machine on and off, putting the electrode in the machine, calibrating so in these little blocks (CDE 2, Patient C).
>
> Most people come with problem solving skills even people that we see with mental health problems or intellectual disability, there are certain problem solving skills, catching the bus to get here on time, so they have already socialised and we are just another component of that socialisation process (CDE 2, Patient C).

The summary figure (Figure 5.11) also shows that CDE 2 has referred to content knowledge (13%) and this is evident in the example of her statements below. In the following statement she lists a number of content elements to be addressed in the education session.

> Familiarising myself, thinking about what medication they might be on, their current blood glucose control, whether they are fearful of pricking themselves or not, routines they might have and how the blood glucose monitoring fits into that so I have a little assessment of their needs and routines and then I make certain decisions on options for monitoring frequency for example, the paperwork being familiar with the patient and my equipment, you do this a lot so after a while you don't think about it.
> (Study 1, CDE 2, Patient C)

The statement also provides further examples of her general pedagogical knowledge and knowledge of learning when she again identifies the need to assess the learner at the beginning and acknowledge any issues which could impact negatively on their learning such as fear of pricking their finger.

CDE 2 had a positive view of her role and the skills of the patient on arrival at the education session as indicated below. CDE 2 recognised different skills and abilities in the patients.

> So I am a facilitator for them to adopt these skills and usually it is starting off with some familiarisation process the background and you feel find that some people are really technical, so they are very comfortable so you don't have to labour the point whereas other people are less familiar with the technical things, they are a bit technophobic so you relate it back to something that they are familiar with operating so that is the starting ground, the base ground. (Study 1, CDE 2, Patient C)

CDE 2 also had confidence in her own ability to relate content to the patient's own knowledge and experience in a useful way despite her comments to the contrary before the first interview.

The statement below is an example of CDE 2 demonstrating her knowledge of learning. CDE 2 recognised the importance of the learner feeling comfortable and started the education from what Patient C already knew and then moved to new knowledge.

> I always make some sort of contact with the patient and make them feel comfortable, then ask them what they know about self monitoring, do they know anyone who does it, then explaining the kit and equipment and all its different parts and then actually going into the process. (Study 1, CDE 2, Patient C)

This teaching approach could help the learner to connect related concepts which assists encoding, storage and retrieval for later use. In this statement CDE 2 also suggested that teaching the patient how to use the monitor involved discreet components of information or steps in the process of monitoring. This suggested a teaching model similar to that of Ausubel (1963) where the whole activity is described first and then each of the parts.

Case 4

Figure 5.12 indicates that in the interviews before and after the education sessions with Patient D, the most frequent statements provided by CDE 2 were classified as general pedagogical knowledge (39%) and content knowledge (31%). The interview statements also provided a moderately frequent number of statements about the CDEs knowledge of learning (23.4%). The remaining categories of curriculum, PCK and learner characteristics were low frequency ones with no examples of educational contexts or knowledge of educational ends, purposes and values and their philosphical and historical grounds.

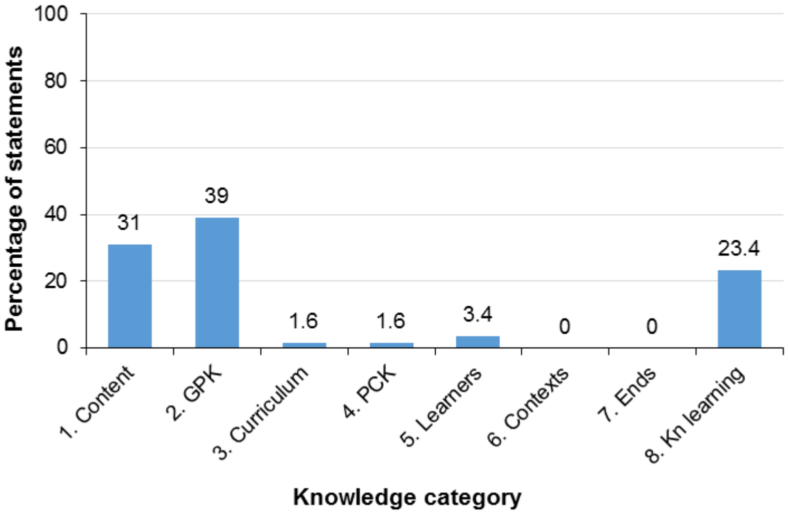


Figure 5.12. Percentage of statements (n = 58) in knowledge categories: CDE 2, Patient D.

Examples of CDE 2's GPK with Patient D include:

> Probably having something visual and hands on and a little bit of colour like this particular machine that he is going to use has a prompt instruction sheet that is colourful and easy to follow.
>
> because it is a fairly new meter to me, I have tried to become as proficient as I can with it so that I am clear as to the step by step instruction on it and don't create any confusion.
>
> Allowing him to ask questions. Giving him some literature to take home to refer back to and providing some guidelines as to what the target is for blood glucose levels.

As can be seen in Figure 5.12, the interviews with CDE 2 before and after the education session with Patient D contained content knowledge in almost a third of the statements (31%). This may have occurred because Patient D had been diagnosed with diabetes for some time but had not attended any education sessions until a short time before participating in this study.

> I would like for the outcome of the session to be that they are able to test their own blood glucose level, that is the aim and then under that would be that they would understand what the levels mean and when to test and maintaining hygiene and safe sharp disposal. Those 4-5 things would be the important part of the sessions and anything else could be reinforced later. Just the how to and safety issues. (Study 1, CDE 2, Patient D)

Thus, CDE 2 appeared concerned about his diabetes knowledge and used examples of diabetes information when describing her teaching plans. As evident in the statement below, CDE 2 was also concerned about Patient D’s safety with the potential for low blood glucose levels.

> In terms of regulating meals and making sure that their blood glucose levels are not too low, if they are upset and aren’t exercising, to have hypoglycaemic treatment with them also about high blood glucose levels. (Study 1, CDE 2, Patient D)

These concerns about safety were further evident in the statement below when CDE 2 mentioned that Patient D had an alcohol problem. This statement below is also evidence of her knowledge of learning (23.4%) and her knowledge of learner characteristics (3.4%).

> Just the importance of how variable the fact that post prandial readings can be. He is very concerned about when he goes out for meals and has alcohol, he wants to know what his readings are after that and just pointing out the variability and it can be a bit inconsistent. So making him aware of that and it is best to do pre and post prandial for that meal which he was going to do anyway. (Study 1, CDE 2, Patient D)

Thus, the statements from these interviews with CDE 2 provide evidence that she is thinking about teaching in relation to the specific characteristics of Patient D and thus the statements used to categorise her knowledge of teaching and learning are applied to the individual and contain relevant content knowledge for that patient.

This next statement showed the CDEs knowledge of learning and the importance of adapting her teaching approach to the individual.

> Today it is going to be a very supportive role because he has had a couple of lots of bad new so he is a little bit disorganised by it. So first of all I don't know how much he is grieving, how close he might have been to his Dad who died.

Figure 5.13 is a summary figure of all eight interviews with CDE 2 before and after the education sessions with Patient C and D. It shows the averages of each category of knowledge held by CDE 2 as evident in the statements made during the interviews.

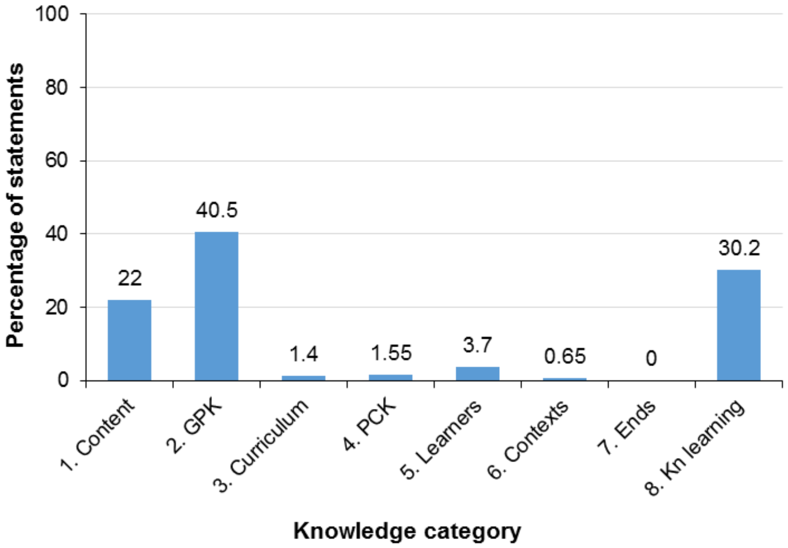


Figure 5.13: Average of combined analysis of CDE 2 statements in knowledge categories.

In Figure 5.13, the total for general pedagogical knowledge (40.5%), learner characteristics (3.7%) and knowledge of learning (30%) is 74%. This suggests that CDE 2 did access a sizeable amount of knowledge related to teaching, with many of her statements about teaching concerned with the general nature of teaching and about one-third being concerned with the nature of learning processes. This is of particular interest when looking later at the quality of these statements.

COATSRUAM—Analysis of Learner Activity

Case 3

CDE 2 provided many examples of how the learner would analyse the content of blood glucose monitoring and break it down into its parts. It is likely that this was prominent in this interview because Patient C had a technical background and directed the discussion along these lines in the education session, this raising the focus of CDE 2 about this element of her teaching.

> It was true to what I expected. He had good technical knowledge and he was ahead of me in things, either asking ahead of time do you have to calibrate the machine and things like that so he was quite good with that. (Study 1, CDE 2, Patient C)

The following statement made by CDE 2 after the first education session with Patient C is indicative of the breadth of her knowledge of learning and how different teaching approaches enables the learner to use the information provided in constructing their own understanding of blood glucose monitoring.

> Probably giving the overview of the equipment and breaking it down into the components of the equipment, the jargon, the terminology so he understood it. So being very clear about each part of the machine and what it does do, I thought that was pretty clear but the rest I tried to make as interactive as I could and rather than actually teaching by telling, a combination of exchanging the device back and forth and a little bit of chat, joking a little bit. (Study 1, CDE 2, Patient C)

After education session 2, CDE 2 identified several aspects of learner activity that are required for knowledge construction. In the following statement by CDE 2, there is evidence of most categories in the COATSRUAM framework of learner activity.

> It was one of the best ones I have ever had. He is so organised. He is very serious about what he is doing with testing frequently because he wanted to, six or seven times a day, pre and post meals and he understood about the levels, the only thing we discussed was the pre and post, he hasn't wanted to see a dietitian but the pre and post levels I have to discuss it with the dietitan myself but they seem to reflect that there isn't a lot of variation, he is starting off high and he might go up 2 or 3mmol and that is it pre and post state and the figures are fairly consistent all the way through so it is not erratic. If he was having uneven carbohydrate distribution, all that sort of

> thing. So I have left it up to him to follow up on a dietitian appointment but they were very high and his doctor has been very proactive and started him on diamicron so that changed the direction of the education session a little because we needed to talk more about hypoglycaemia and all the aspects of it and how the tablet works. He has gone through it all before but just to make sure. With his current levels he is not at risk but they are coming down and he can see the trend coming down as well and he is doing his averages, now he knows that the QA is done, the meter is accurate, the levels he can trust that they are correct so it was good. He seemed very keen to get on top of it and control his diabetes, self manage. (Study 1, CDE 2, Patient C)

As evidenced in Figure 5.14, CDE 2 had a high frequency of statements of learner activity involving analysis, a moderate frequency of statements indicating context and orientation learner activity and a low frequency for the learner activities of transformation, storage, retrieval, utilisation, attention and management.

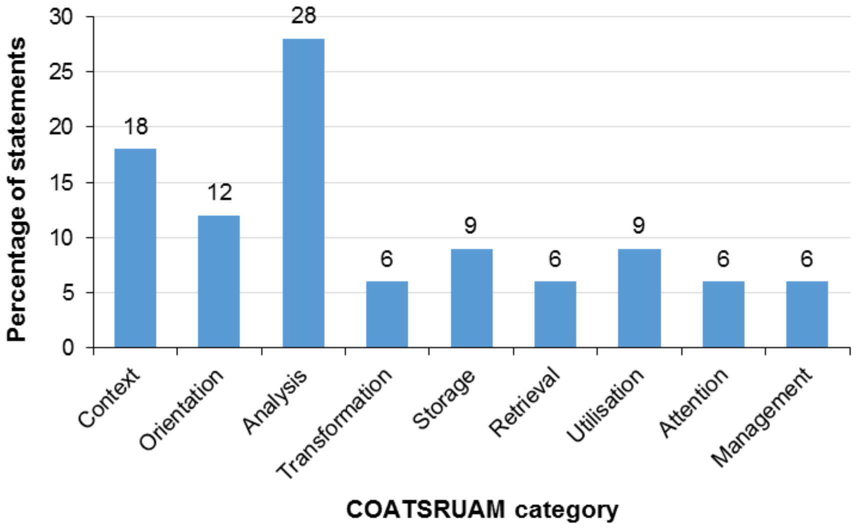


Figure 5.14. Statements in COATSRUAM categories CDE 2, Patient C.

Case 4

In the interviews with CDE 2 about Patient D she also identified some key elements of learner activity. The extract below provides examples of how CDE 2 recognises the importance of the learner being receptive to information and the idea of learning.

CDE 2 also notes the role of the learner's willingness to learn in terms of practice and discussion about what is being demonstrated.

CDE 2: He was receptive to the information and willing to practise what was being demonstrated and talked about (Study 1, CDE 2, Patient D).

Interviewer: How did you know he was receptive.

CDE 2: Well he would say things like oh like this and move the meter, he observed there were two entering ports for the strip and asked if he could put it in a certain way or is one for the check and one for the, he asked relevant questions. Wanted to know how to operate it correctly.

It also became apparent that CDE 2 had a clear understanding about how learner activities assist learning when this idea was pursued. As seen above, she noted that the role of questions and clarification was important for the learner to construct accurate knowledge networks for later use of the new information.

In the statements below, CDE 2 identified that interaction as well as feedback is important as the learner analyses the parts of the new information. CDE 2 also suggests that Patient D was an independent learner with problem solving skills and meta cognitive skills to identify how to utilise resources and information to develop his understanding of the meter and blood glucose monitoring.

Interviewer: The sorts of things he was doing like asking questions, playing with the meter, practising things how does that help him to learn?

CDE 2: It is instant feedback, if I said the end button is the start button and he pushed the end button and it didn't work it wouldn't be a very positive learning experience, the fact that it was as stated.

Interviewer: So it is about feedback and recognition.

CDE 2: Yes.

Interviewer: Is there anything else that he did that you thought that is good that will really help him to learn this or remember this.

CDE 2: That he was pretty independent with it, so he actually probably could have gone home with the book and meter and worked it out, the technical how to and it was just other things the educational

> items like when to test and what the results meant, was probably just where he needed guidance.

In Figure 5.15 there is a relatively even spread of statements by CDE 2 about learner activity in the interviews related to the education sessions of Patient D. It is possible that this even spread occurred because of the focus by CDE 2 on the difficult personal circumstances Patient D was experiencing.

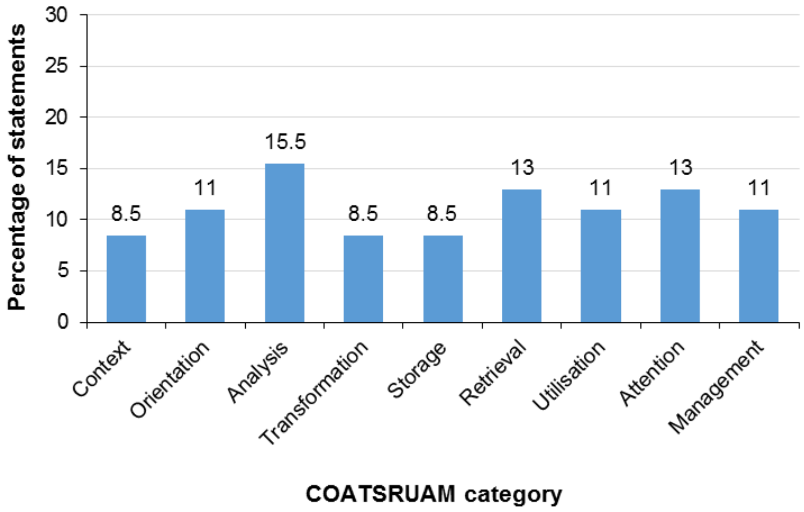


Figure 5.15. Statements in COATSRUAM categories CDE 2 Patient D

A summary of CDE 2 knowledge as provided during the interviews with Patients C and D is shown in Figure 5.16. There is a more even spread across the categories for CDE 2 than previosuly seen for CDE 1 and there is some discussion of all types of learning activities.

On average, CDE 2 provided a high frequency of statements indicating learner activity of analysis, moderate frequency of statements of context, orientaion and utilisation and low frequency of attention, retrieval, storage, management and transformation. The interviews before and after the education sessions with Patients C and D provided insight into the knowledge of learner activities CDE 2 understood to be important for learning.

Overall the frequency of statements about activities for learning showed a fairly even distribution of statements about learner activity.

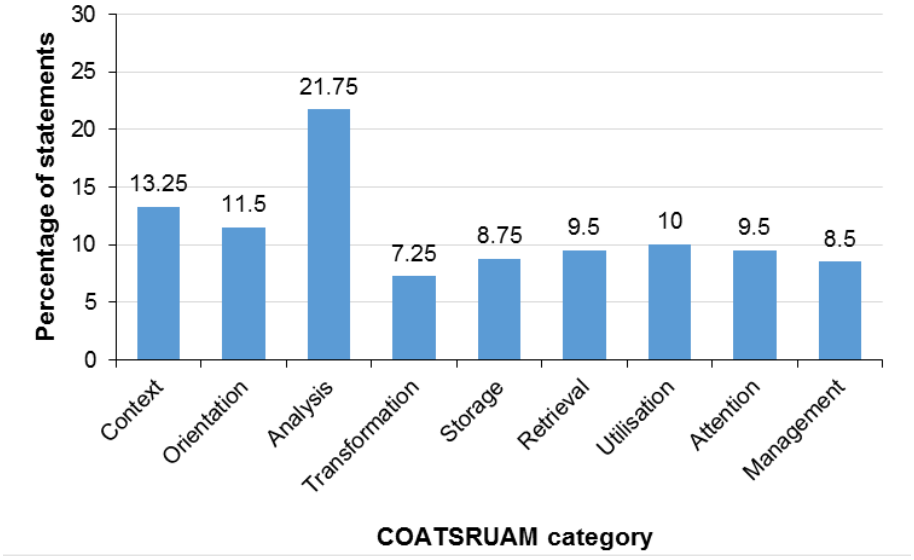


Figure 5.16. Averages of statements in COATSRUAM categories for CDE 2.

CDE 2 reported a determination to provide education in a way that reflects the patients' needs as well as their knowledge and skills. As was the case for CDE1 the analysis category was the most reported category, taking up about one-fifth of all statements. The frequency for transformation was lower than for the other categories, which is of concern in an introductory education session where guidance for the patient in interpreting and encoding new information is critical. However, the profile of frequencies in Figure 5.16 suggested that CDE 2 had accessed knowledge about the whole range of activities for learning included in the COATSRUAM framework.

Quality of learner activity statements

In the final analysis of the statements about learning activity made by CDE 2 where each statement was rated in terms of it quality, CDE 2 was the only educator to link her teaching to a theory. Interestingly, CDE 2 referred to "Rogers" in one statement. This may have been a reference to the nursing theorist, Martha Rogers who was a public health nurse in the United States in the 1940s and later became a Professor of Nursing at New York State University. However, it is possible, though perhaps less likely, that CDE 2 was in fact referring to Carl Rogers and his person or client centred therapy which is focused on the clients' capacity for self-direction and understanding of his/her own development.

It is also possible that CDE 2 was referring to the nursing theorist Hildegard Peplau whose work emphasised the nurse-client relationship as the foundation of nursing practice. Peplau's work on the seven roles of nursing included the domains of dependence, interdependence, and independence as part of her theory on the surrogate or advocate role of the nurse. The following is the relevant quote by CDE 2.

> Probably different stage and going by the nursing philosopher was it Rogers Dependent, Interdependent and Independence so they are various stages there and it starts off where the person it is all new and they are going to rely on you and you need to provide that comfort base, the softness to get them started and then they start acquiring skills and feeling more confident and they go on and basically contact you when they want something and they use to get what they want. (Study 1, CDE 2, Patient C)

Whilst the name of the theorist may not be correct the understanding that the idea, which is more aligned with the social theories of cooperative learning, applies in diabetes education is of note for CDE 2 in her role as a credentialled diabetes educator.

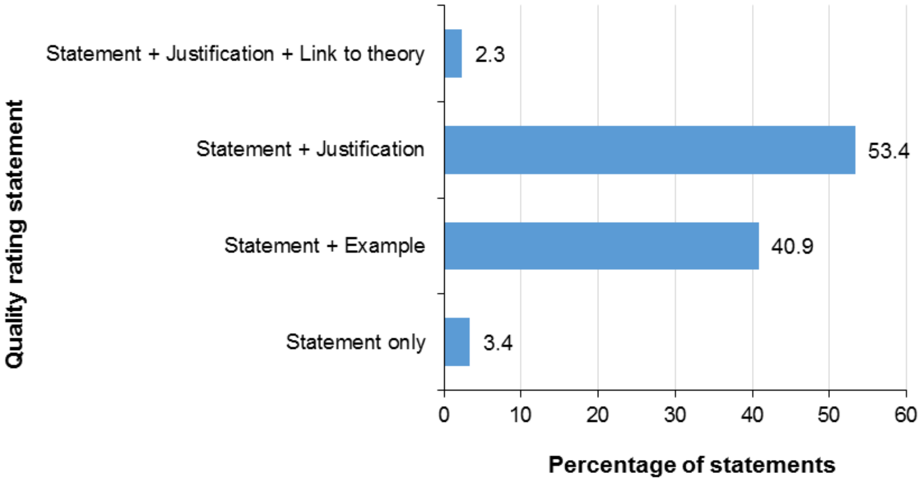


Figure 5.17. Quality rating of statements provided by CDE 2 in Study 1 in relation to education sessions with Patient C.

CDE 2 was attributed with level 4 quality knowledge about teaching as evidenced by the above statements. Whilst limited in extent, it does indicate that she does hold at least some high quality knowledge on which to draw when teaching. The perspective she set out in reference to interdependence/dependence and stage of teaching can be seen as based on a coherent organising framework that could be revisited during the progress of an education session.

Unlike in the interviews with Patient C, CDE 2 did not make any statements that reflected the fourth and highest level of statement under this quality rating scale in interviews related to Patient D. As noted earlier, it is likely that this occurred because this patient (D) had other issues of concern, notably the death of his father and a blood glucose meter which was unfamiliar to the CDE.

Figure 5.18 shows the quality rating for statements made by CDE 2 in the interviews before and after the two education sessions with Patient D.

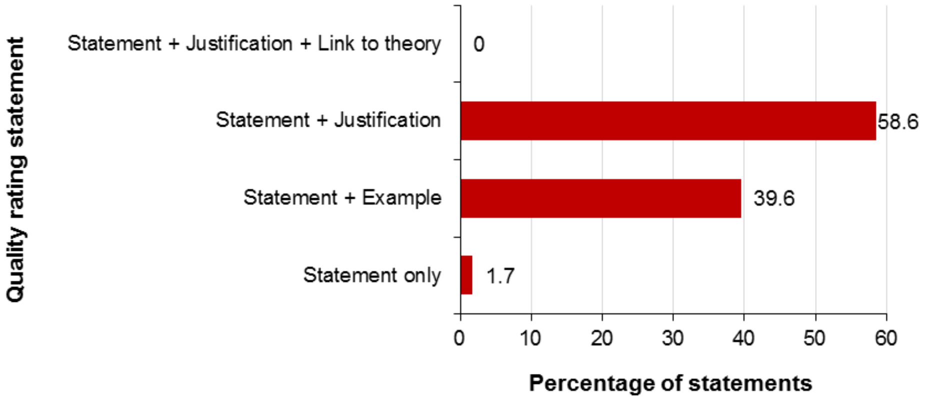


Figure 5.18. Quality rating of statements provided by CDE 2 in Study 1 in relation to education sessions with Patient D.

Examples of statements identified as levels 1, 2 and 3 on the quality rating scale are provided below. The first extract below is from the interview with CDE 2 following the first education session with Patient D. In this example, CDE 2 is essentially listing each of the components of blood glucose monitoring which were demonstrated and discussed in the education session.

Interestingly, this statement was made in response to a question about what the CDE thought Patient D “would know and understand after that session”*.* This is interesting because it was anticipated that the CDE might respond with an example of Patient D’s understanding rather than a checklist for monitoring.

> Interviewer: What do you think he is going to know and understand after that session.
>
> CDE 2: How to actually operate the machine to do a blood glucose test. What the levels mean in terms of hyper and hypoglycaemia. How to dispose of his sharps and his electrode. Where to get supplies and when the best time is to test. About the warranty and getting support from the company and the computer cable and downloading and some specifications of the meter itself, things like how much does the memory hold and how to reset the settings.

The following is an example of a level 2 statements as an example of the teacher and learner relationship. CDE 2 does not go on to describe how this is done and does not justify why it is necessary for learning and as such it is rated as a level 2 statement.

> Well there is a very large body of information about diabetes and the management of diabetes and one of the ways that people receive information in that kind of relationship is with a teacher and a learner relationship, so you are imparting some of the knowledge you have acquired in your specialty area and passing it on in that way. (Study 1, CDE 2, Patient D)

The next account is an example of CDE 2 making a level 3 quality rated statement when talking about Patient D. In this paragraph, CDE 2 explains and justifies her actions about why she provides broad information initially and changes her actions based on how the information is received.

> It is part of facilitating their ability to acquire self management skills, they start off by asking for advice, you give it in a broad sense, you try to be as broad as possible so that if they can understand that concept they can then work on that knowledge themselves rather than just prescriptive moment to moment information. A little bit of the conceptual side if they are able to deal with that. (Study 1, CDE 2, Patient D)

This extract also identifies that CDE 2 is flexible and adapts her teaching based on the patients' needs.

The following figure is a combination of the quality rating analysis of statements made by CDE 2 in the eight interviews before and after the education sessions with Patients C and D.

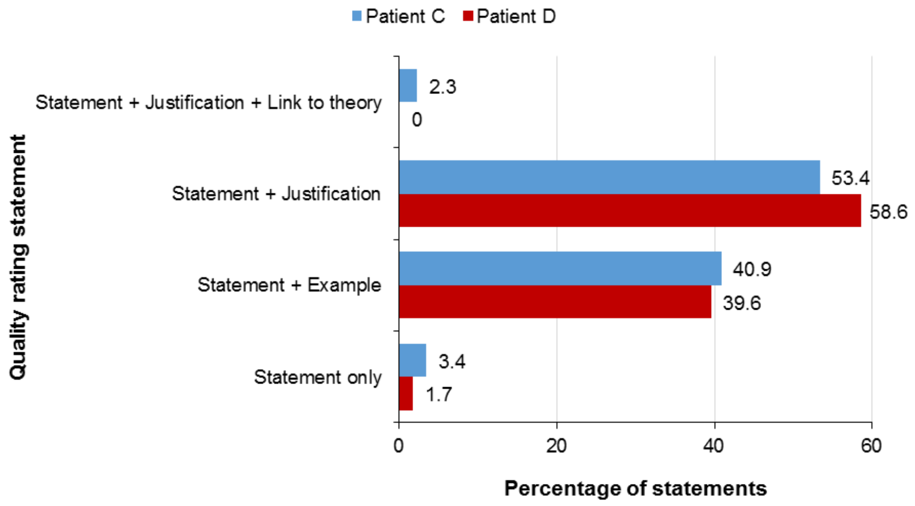


Figure 5.19. Quality rating of CDE 2 statements in relation to Patient C and Patient D.

Figure 5.19 shows a larger number of statements were identified as level 3. These statements included a justification for the teaching action and indicate a slightly higher frequency of such statements than provided by CDE 1. In these interviews CDE 2 commented about the independent nature of the Patients C and D which may have enabled her to focus on her teaching actions and their contribution to the learning. This led to CDE 2 being quite positive about the education sessions and thus describing her understandings of teaching and learning in a more detailed manner and with justification.

CDE 2 also provided one statement which included a theoretical link, albeit unclear. This suggests that CDE 2 does have some theory on which to draw in the time limited but dynamic teaching environment of diabetes education. Given that the presence of level 4 statements is low in frequency terms it does suggest that CDE 2 may still experience some difficulties generating different teaching approaches and new strategies in demanding teaching sessions.

In summary, CDE 2 is similar to CDE 1 in that the teacher knowledge most frequently reported is GPK and content knowledge with little discussion of PCK. CDE 2 has a more even spread across the COATSRUAM learning activity categories. However, for both CDEs the lower frequency of statements relating to management and transformation activity is of concern. Most statements about learning activity did not show an explicit link to theory, so whilst there is evidence of knowledge related to teaching and activities for learning, most were not at the most powerful level of quality.

The transcripts were also analysed for themes related to the research questions. The findings for the theme analyses for CDE 2 in the interviews with Patient C and Patient D are presented below.

Understandings about Teaching, Learning and Roles

The following section is a general analysis of recurring themes about teaching, learning and the roles of the diabetes educator and the patient from the interviews with CDE 2. The understandings about the CDE and patient roles are presented first as they influence the CDE views and beliefs about teaching and learning.

Understandings about the CDE role

CDE 2 was a novice credentialled diabetes educator with a passion for primary health care. As such she had a distinct view of her role which reflected the philosophies of this area of health care. This view of health care is aligned with an equal partnership model of care and a shared approach to achieving goals. CDE 2 goes on to say that she perceives her role as a nurse first with a focus on education.

> Mainly I am a facilitator, I come from the approach of promoting self management.
>
> I am an RN who specialises in diabetes education and that my role as part of a team is that the person is the focus for the education session and the team is there to support them in their learning, so I am just one of those people that is there to help them extract the information they want and need to manage their diabetes to a level they want. (Study 1, CDE 2, Patient C)

She continues this differentiation in the following statement which suggests she has a dislike for the word teacher or educator.

> Because of the pedagogy type situation, … sometimes I might say I understand because someone in my family has diabetes but I don't like being thought of as a teacher or the term educator for that reason, but I haven't come up with anything better.
> (Study 1, CDE 2, Patient C)

When pursued on this point a clear and possibly long-held understanding about the role of the teacher became evident. CDE 2 had an understanding that the view that teachers were special or different and had all the knowledge could be problematic, even if it was to some extent the case. She was clear that this difference created a separation of teacher and learner and that this was not the way to encourage self management in people with diabetes.

> It is creating an elite, that separates the person with the condition from the person providing the services and that somehow we have some special skills and knowledge which in a way we do but I don't think it helps the self management process if there is too much of a separation between the educator and the person receiving the education because then it creates that dependency that you are the one who is going to fix everything whereas I like to see it as a decision making, problem solving process.
> (Study 1, CDE 2, Patient C)

Whilst the link between her understanding of the teacher role and the dependence of the learner is clear it indicates a limited or traditional understanding of the role of the teacher. It is in keeping with the idea of a transmission model of education which she does not want to subscribe to and as such recognises the relevance of her role in influencing this education approach which she does not like. She also notes that whilst everything she does has an element of providing information, which would normally be attributed to this transmission model of education, there are also other elements to what is imparted by the diabetes educator: “Everything you do involves imparting information and knowledge and confidence and skills” (Study 1, CDE 2, Patient C).

CDE 2 did not however, elaborate on how she imparts confidence and skills. Her understanding of confidence was tied to self management as is evident when seeking more information about self management. When asked what self management meant she noted it is about “having the knowledge and skills to be confident in making decisions and adopting behaviours” (Study 1, CDE 2, Patient C).

CDE 2 had completed four interviews with Patient C and was embarking on the four interviews and education sessions with Patient D. Her understandings of her role became more explicit and more wide ranging in this case with Patient D.

> Today it is going to be a very supportive role because he has had a couple of lots of bad news so he is a little bit disorganised by it. So first of all I don’t know how much he is grieving, how close he might have been to his Dad who died, so there might be a little bit of filtering of information. (Study 1, CDE 2)

The statement above identifies other elements of the diabetes educator role which is more closely linked to the health professional role than the teacher role. The issue of ‘filtering of information’ is addressed below under learning. CDE 2 goes on to differentiate between these roles for Patient D.

> There is technical advice and then lifestyle and an advisor, facilitator to link people with services. Also that supportive role as a listener and being receptive to their psychosocial needs. So I suppose there is the teaching component to it and the professional role of a person being able to refer to you for advice. Referring to services. (Study 1, CDE 2)

CDE 2 is very clear she has a multifaceted role and identifies some of the varied labels given to the different aspects. Interestingly she compartmentalises them into professional and teaching roles and appears to include listening in with the supportive professional role.

CDE 2 acknowledges the teaching component involves a large body of information but it appears this teaching role is founded upon the professional role where the knowledge was acquired.

> Well there is a very large body of information about diabetes and the management of diabetes and one of the ways that people receive information in that kind of relationship is with a teacher and a learner relationship, so you are imparting some of the knowledge you have acquired in your specialty area and passing it on in that way. (Study 1, CDE 2)

When questioned about ‘passing on’ the information CDE 2 has a very clear understanding about how this occurs and that it is a process promoting self management and application of knowledge by the learner. This is not wholly a view of learning as a matter of transmission because she is explicit that the patients can then “work on that knowledge themselves”.

> It is part of facilitating their ability to acquire self management skills, they start off by asking for advice, you give it in a broad sense, you try to be as broad as possible so that if they can understand that concept they can then work on that knowledge themselves rather than just prescriptive moment to moment information. A little bit of the conceptual side if they are able to deal with that. (Study 1, CDE 2, Patient D)

However, when this idea was pursued CDE 2 diverted into extreme situations where concepts could not be used in teaching such as with a person with Aspergers.

> You may have someone that has Aspergers or some other mental health issue or there might be some memory loss or problems with ageing that make it a little bit more concrete.
> (Study 1, CDE 2, Patient D)

Further questioning on this point of conceptual teaching revealed that CDE 2 had recently begun to consider this idea following the four interviews with Patient C and as such did not yet have a clear idea about her own understandings of conceptual or prescriptive teaching.

> I don’t even know, I haven’t looked if I convey concepts, I might be really prescriptive. Having that last session made me think about what I do a lot more and probably it is pretty teacher student prescriptive do this do that. (Study 1, CDE 2, Patient D)

Understandings about the patient's role

Case 3

CDE 2 was very clear that the role of the patient is to be self managing and when asked what self managing means she was quick to say:

> Having the knowledge and skills to be confident in making decisions and adopting behaviours that will help them maintain their blood glucose levels and lifestyle factors, it is mainly about confidence and ability to adopt behaviour. (Study 1, CDE 2)

CDE 2 further explained that the role of the patient is an active role and that she encourages this by including both thinking and doing aspects in the session.

> It is a role of acquiring a skill and adopting that as a behaviour and in the session it is interactive, asking questions and practising, so I try to make the session both cognitive and practical. (Study 1, CDE 2)

However, CDE 2 did not believe that the patient role was only as a recipient of information and integrated her partnership view of her role into her understanding of the patient role by acknowledging the contribution of the patient.

> That his skills and knowledge are respected and valid and that it is worth doing. At the end if he gets some results, changes or affect from that, at least he has been actively engaged in that process.
> (Study 1, CDE 2, Patient C)

Case 4

In the interviews with Patient D she recognises that the use of the term patient is used for convenience rather than to imply any dependence which can be how the term is understood within health care.

> tend to call them patients ... it is a convenient term for us to describe the person but not everyone sees themselves as a patient and handing over their total care, they come here to get information to have information about diet monitoring etc.
> (Study 1, CDE 2, Patient D)

CDE 2 is keen for the patient to have an active role in their education and identifies their level of interest as an indicator of their willingness to accept the responsibility for their learning.

> Well by showing interest they have actually taken on more than a passive role, they are actively engaged in that learning process and exploring more. (Study 1, CDE 2, Patient D)

Understandings of Teaching

Case 3

In the interviews with CDE 2 she was focussed on the content of the education session when answering questions about teaching. Hence, her statements about teaching may be biased toward teaching a skill such as blood glucose monitoring even though it also has a knowledge component.

> Showing pictures actually having the equipment available and they play with it, demonstrating and getting the person to repeat some of the skills. (Study 1, CDE 2, Patient C)

CDE 2 identifies in the above statement that teaching is made up of different components such as showing, demonstrating, learner participation and repetition. It was unclear how different showing and demonstrating were in her understandings but she later described her idea of demonstrating in the following way.

> Probably giving the overview of the equipment and breaking it down into the components of the equipment, the jargon, the terminology so he understood it. So being very clear about each part of the machine and what it does do, I thought that was pretty clear but the rest I tried to make as interactive as I could and rather than actually teaching by telling, a combination of exchanging the device back and forth and a little bit of chat, joking a little bit. (Study 1, CDE 2)

This description of demonstrating is interesting as it is quite detailed. This is in contrast to the CDEs plans for education session 2 or follow-up session. She notes that time has been a limiting factor for her in preparing for the session but describes her teaching approach as ‘just a case of bumping into it and going for it’.

> It is a follow-up session so I guess the plan loosely is to follow on from having had that first appointment and teaching him and dealing with anything that comes up out of that. Also because I actually

> haven't, it is terrible to say the time, but today I haven't even looked at his notes and come up with anything, it is just a case of bumping into it and going for it. (Study 1, CDE 2)

This 'loose' approach for the session suggests a level of confidence by the CDE to respond to issues as they arise. It also suggests she believes she has the teaching knowledge and skills on which to draw.

Case 4

The interviews with CDE 2 in relation to Patient D provided some different examples of her understandings about teaching. In these interviews, CDE 2 seems to be anxious about teaching Patient D how to use a meter with which the CDE is not familiar.

> Well the first thing is because it is a fairly new meter to me, I have tried to become as proficient as I can with it so that I am clear as to the step by step instruction on it and don't create any confusion, oh here do this oh no that is not right do this sort of thing. Following a fairly logical format and allowing him to practice the different steps. Again it comes back to the language being used, the terminology so he knows at the start what I am referring to when I say the electrode goes into the entry port, things like that, and showing him the pictures of the meter. Allowing him to ask questions. Giving him some literature to take home to refer back to and providing some guidelines as to what the target is for blood glucose levels. (Study 1, CDE 2)

In the above excerpt CDE 2 again notes the importance of accurate terminology and jargon as she did in interviews before and after Patient C. CDE 2 appears to be concerned about the patient understanding each part of the meter and its correct name so she can use it in her instructions without confusing the patient.

The quality of the literature being given to patients was also noted as important in the teaching.

> A pamphlet that is very concise and easy to follow so if they have any queries about what did she say I am supposed to be after dinner, they have it there. (Study 1, CDE 2)

This statement demonstrates her understandings of how a patient might use resources to support their learning after an education session.

There was very little additional evidence of her understandings about teaching in the interviews related to patient D which has not been addressed elsewhere.

Understandings of Learning

Case 3

As noted above CDE 2 had a clear understanding about teaching and learning and its relationship to self management. She had a belief in learners' skills and abilities to learn and believed that it was her role to present information in a way that was familiar and comfortable for the learner.

> I come from the approach of promoting self management and my philosophy with that is I think everyone can learn a skill as long as it is presented in a way they are familiar with and comfortable. (Study 1, CDE 2)

She elaborated on this notion of learning being about the teacher bringing out the learners skills and behaviours that will enable them to learn. This was her fundamental belief and the starting position from which she began her teaching.

> so that is the basic premise that people have these skills and you just need to bring them out for that particular learning behaviour. (Study 1, CDE 2)

CDE 2 also recognised different types of learning and learners and adjusted her teaching to fit with their learning needs. An interesting example of this was below with Patient C where she had assessed his learning style as being abstract and conceptual. In this extract from the interviews she talked about limiting the detail and the fiddling around with parts of the demonstration. CDE 2 suggested this was too pedantic for an abstract learner. However, it was more likely to be because he was comfortable with the technology and wanted to understand the big picture from the CDE as he could learn (teach himself) the details from the instruction manual.

> He learns more by abstract thinking, so he does learn concepts and theory and, to be too pedantic about demonstration and fiddling around, I think he would see that as a bit patronising. (Study 1, CDE 2)

Whilst the rationale may not be completely correct, the decision to not be patronising was appropriate. CDE 2 used charts and pictures as another example of how she believed Patient C liked to learn in the abstract.

> Quick and easy. He liked the chart and being able to go through the basic steps he liked viewing that, that way he quickly got, a picture is worth a thousand words so he liked that, he saw the components of the kit and it showed the proper terminology for that particular device. (Study 1, CDE 2)

CDE 2 often noted the importance of the patient having good problem solving skills. This understanding was probed in each interview with the following excerpt best reflecting her understanding about transfer of knowledge, though this terminology was not used by here.

> Just to have the ability to apply the skills in one area into other areas. The ability to, it is a synthesis, it is like a synthesis where you can use things that you have gained in other areas. I suppose if a person is really good at programming a video or a digital clock you would anticipate that they will have the problem solving skills to operate a meter. (Study 1, CDE 2)

CDE 2 mentioned she would like to find out more about Patient Cs learning approach. When asked how she would find this out she said:

> probably doing a little bit of a literature search and getting some background information on how people learn because it is not in the front of my awareness really that kind of information.
> (Study 1, CDE 2)

This statement was interesting given CDE 2 had shown a wide range of general knowledge about teaching and learning and how her role enabled learning.

Case 4

In the interviews related to Patient D, CDE 2 talked about the need for the learner to be active and engaged in their learning. CDE 2 identified asking questions and seeking clarification as an important way to demonstrate active learning.

> Well by showing interest they have actually taken on more than a passive role, they are actively engaged in that learning process and exploring more. I might have said something in a way they don’t

> quite understand and they might like that repeated in another way. They will say I didn't understand this.
> (Study 1, CDE 2, Patient D)

CDE 2 also noted that she was unfamiliar with the meter she was demonstrating to Patient D and as such this meant they would be doing some learning together.

> My lack of familiarity with the machine and there was one thing that I didn't do correctly so we were getting an error code and we read through it. But I did explain to him that I wasn't 100% familiar with the machine and that we would be learning together a bit so he was fine. (Study 1, CDE 2, Patient D)

She followed up this idea of learning together by saying that she doesn't set herself up to be the expert.

> Okay, it was okay. I don't try and set myself up as the real expert. He didn't seem to mind and we managed to clear up things, the things that I wasn't sure about we actually went through the manual together. (Study 1, CDE 2, Patient D)

This idea of "going through the manual together" appears to have occurred because CDE 2 was unfamiliar with the meter. However, this would be a useful way of teaching and learning which could be incorporated into any education session. It is unclear if this is an understanding about learning held by CDE 2 or if it was a compromise position taken because of the circumstances.

Patient Understandings

Patient C

The following section describes the findings from the interviews with Patient C before and after the two education sessions.

Understandings about the CDE role

Patient C was clear about his understandings of the role of the CDE. He stated that the title included the word *educator* and as such they should educate. However, he also understood the role to include a support or counsellor type role.

> As the name sounds, education and probably to a certain small extent a bit of an ear to listen too, an ear to be spoken at sort of thing if someone has problems or needs some assistance or understanding probably to a lesser degree but the main thing would be as it sounds as an educator. (Study 1, Patient C)

When probed further about what the term educator means in terms of the CDE role he suggested that:

> I suppose ask questions and once they have put forward, after the initial sessions where most of the education is done, yes just ask questions and find out if anybody has any problems, anything they don't understand or anything new that they would like to know.
> (Study 1, Patient C)

Patient C had an understanding of the role of the CDE as being responsible for information provision, support and a cooperative approach to work with patients to identify areas for improvement in their diabetes management.

> I think that is their role to get that point across. They give you indications and help me in what I should be doing and not be doing but it has to fall down to me basically. (Study 1, Patient C)

Understandings about the Patient role

Patient C was asked about his role in diabetes and he was very clear about his understanding of his role stating that “My role is basically looking after myself. No one is going to do it for me. That is it in a nutshell”.

When asked about his role more specifically in the education session he was more focussed on his role involving learning. His understanding was focussed more around learning and understanding.

> The initial session is just to learn and understand. The sessions down the track I suppose are just to once again learn and see if there is anything new to learn and I think that is it.
> (Study 1, Patient C)

Patient C had a view of his role which was active and engaged. His understanding involved being a recipient of information and also doing something with the knowledge so he could also *understand*.

However, he also identified that his role would change over time as he saw the need to learn as the focus initially but then, his role would be more about asking questions about individual issues: “Ask questions, that is probably the biggest thing I think on both sides. Ask and answer questions”. (Study 1, Patient C)

It was clear that he understood that the role of the diabetes educator would change in a similar way over time as well.

Understandings of Teaching (Patient C)

Patient C was a tradesman and worked with apprentices. When asked about his understandings of teaching he said it was “hard” and laughed. He continued by saying, “Getting across knowledge of what you are trying to teach, what there is to learn”.

He then went on to talk about working with and teaching apprentices and provided the following explanation about teaching: “Generally it would be verbal instructions, tell them what to do, show them what to do and they would generally do it and supervise what they are doing, along that process they learn” (Study 1, Patient C).

When asked directly about teaching in a subsequent interview, Patient C was more focussed on the knowledge components of teaching by saying, “teaching to me would be the issuing of knowledge I suppose, giving out new things, getting new ideas across, knowledge across”.

However, when reviewing the education session and identifying activities of the CDE he noted the following as an example of teaching.

> The actual pricking of the finger she did it first and then asked me to do it and that is a good method, showing and then doing sort of thing. Pretty well everything she got me to do after she had showed me. (Study 1, Patient C)

Patient C identified a teaching process (demonstrate–practice) commonly used in psychomotor skill teaching which would be familiar to him through teaching apprentices. The following quote further supports this approach with the addition of written information to support the demonstration.

> I think I won't have a problem with it, because it was very clear, very simple, it is not complicated, as I said before we had both written and operational usage of it, so I don't think I will have trouble with it.
> (Study 1, Patient C)

Consequently, Patient C reflected on the teaching in the first education session and was confident about his learning because the teaching was provided in a way that suited his learning.

Understandings of Learning

A variety of questions were asked in the interviews about learning and what Patient C understood about learning. Initially he was focussed on knowledge and was brief in his answers: "Intake of new knowledge basically. That is probably it in a nutshell".

When questioned further about learning, Patient C expanded his understanding to include activity and knowledge by saying, "On physical things, instruction is good, but information, I prefer it in reading format, written format".

Further probing of learning a skill with Patient C identified a preference and understanding that included demonstration or being shown how to do a skill: "I like to be shown first and then have a go at actually doing it". However, the need for knowledge to accompany the skills was also identified as an important component of the learning with Patient C stating that "instructions on how to use it would be good. I assume there would be some sort of written instructions".

When asked directly about what Patient C thinks learning is, he replied: "In this case it is understanding what I am doing, why I am doing it and how to do it".

When asked if there was anything specific he does when trying to learn something he said: "Not really just repetition, do things often enough you learn them. Read things often enough you learn them" (Study 1, Patient C).

Patient C was able to identify the need for practice or repetition as well as the need for the learner to be interested in the first instance by stating "Interest is a big thing. If somebody is interested they will listen and take it in. It is very hard to do with a video". When probed further he did not expand on the idea of interest other than to say he had difficulty maintaining his interest and concentration with videos unless they were very short.

Patient D

Understandings about the CDE role

When asked about his understandings of the role of the diabetes educator, Patient D goes straight to the idea of teaching and educating him to use the blood glucose meter.

> Teaching and educating, like she is going to teach me or educate me how to use the machine so either way, she is an educator, teach me how to use the machine (Study 1, Patient D).

When his understanding of teaching and educating is pursued further he notes that it is more than just the information contained in the manual as he can read and understand this himself.

> I have a rough idea by reading in the book what the meter can do, it takes a blood sample and then with all the electronics comes up with a figure, but as I say I have only seen it 3 times and 2 of those were my mates at work and 1 was here. I am not fully conversant with it. (Study 1, Patient D)

Patient D goes on further to say that the role of the CDE is to explain and interpret the meter manual and put it in layman’s terms for him.

> If they can explain it in layman’s terms, it is when people start talking about these things and it can do this and that and it is all this terminology, once they start that. (Study 1, Patient D)

So it appears that Patient D see the role of the diabetes educator to be about teaching and educating which is like an interpreter who puts the information in layman’s terms.

Understandings about the patient role

When Patient D was asked about his role in the diabetes education session he was quick to say that he would “probably try to absorb it all, do you mean physically do”.

When asked more about what he meant by just try to absorb it all he said:

> I will just try to absorb it, because that type of thing is very important, more so the meter because that is going to be a day to day thing, I suppose it is like tuning your video, if you don't know how to tune it, once you have tuned it you have tuned it. But if you don't know how to tune it you won't be able to. It is the same with these machines, if you don't know what you are doing, hopefully I will once I have seen it, but they seem pretty simplistic but there is probably a lot of things you have to take on board. Hopefully I will only have to be told once. (Study 1, Patient D)

Within this explanation there appears to be an understanding that it is his responsibility to 'absorb' the information and that he should be able to learn quickly. When the idea of *'having to be told once'* only was pursued, Patient D suggested that his role also included asking questions when he said "I suppose they can only tell you so much unless you ask questions" (Study 1, Patient D).

Again this reiterates an understanding that his role involves some responsibility for his learning.

Understandings of teaching

When asked about teaching, Patient D acknowledged that the teacher has some knowledge about the content they are trying to impart.

> Well most teachers have got a knowledge about what they are teaching, that is a start, their knowledge, they are relaying their knowledge to you (Study 1, Patient D).

Patient D was very positive about CDE 2 and noted her teaching included explaining things and specifically noted that "she was very helpful, both times I have seen her. She can't do enough for you in terms of explaining things".

In the interviews with patients, they were asked about any experiences they had of teaching in a social, sport, hobby or work related situation. This technique was useful to get them talking about teaching and learning and to extract their understanding. Patient D mentioned that he had been a kid's rugby coach in the past and described how he taught kids rugby.

> Teach them basic skills, a lot of the kids had never played rugby before so you virtually are teaching them from scratch. Here is the rugby ball, here is a hand pass, teach them rules and the fundamentals of the game and work at it from then and maybe as they get a little bit better and older you teach them some more skills and hopefully they take it all on board and become good rugby players in the end. (Study 1, Patient D)

This extract shows that his understanding about teaching involved recognising where the learner is starting from, keeping it simple at first and building on the knowledge and skills as the learner develops their understandings and skills. The idea that the learner will '*hopefully take it all on board'* also identifies some level of responsibility for learning by the learner which is congruent with his understanding of his role in the diabetes education session.

Understandings of learning

Patient D has an active and questioning approach to learning. He mentioned the need to ask if you don't understand something and also the need to ensure the terminology used by the teacher was not complicated terminology.

> If you can't understand it you just ask, you ask in laymen's terms, if you came up with some big long phrase like this and this happens and I will say can you tell me that in layman's terms. I probably would have a rough idea but it is better to know the basic language. (Study 1, Patient D)

Patient D was keen to learn from basic language and simple explanations. He recognised that learning involved listening and that it was interesting when you were listening to someone who knows what they are talking about.

> you are listening to someone that knows what they are talking about and it is always interesting, I am open to that type of thing. (Study 1, Patient D)

As noted earlier, Patient D also used reading the manual as a technique for learning as well as discussion with others.

> I have a rough idea by reading in the book what the meter can do, it takes a blood sample and then with all the electronics comes up with a figure, but as I say I have only seen it 3 times and 2 of those were

> my mates at work and 1 was here. I am not fully conversant with it. (Study 1, Patient D)

However, Patient D was keen to have the manual and casual discussion supplemented with information from someone who knows the content.

Study 1 Summary

The findings from Study 1 have provided useful information from two credentialed diabetes educators (CDE 1 and CDE 2) and four patients (Patients A, B, C and D) about their understandings of teaching, learning and each other's role in diabetes education.

This information is useful as these understandings have not previously been recorded, documented, analysed and described in the Australian context. These findings provide insight into initial diabetes education as experienced by patients and highlight the breadth of issues facing the individual with diabetes and the diabetes educator. It is this complexity of the education session which is important for diabetes educators to understand if they are to develop a set of knowledge and skills so they can select effective teaching strategies during diabetes education.

The analysis of the CDE interview statements using Shulman's (1986a) classification of teacher knowledge and Lawson's (2000) COATSRUAM framework of learner activities identified many examples of CDE knowledge about teaching and learning. However, it was the quality rating scale which identified limited access to theory-linked knowledge about teaching and learning. This finding raises some concerns about the ability of the CDE to generate a new strategy or teaching procedure when required. This is further discussed in the final chapter of this thesis.

CHAPTER 6

FINDINGS: STUDY 2—GROUP EDUCATION

Introduction

Study 2 evolved in response to difficulties with recruitment for Study 1 and used the same design as Study 1 except for a change in context to group education sessions in the community. In this context, blood glucose monitoring (BGM) was the topic for one of the education sessions in a series of diabetes education sessions run by a community diabetes support agency. People with type 1 or type 2 diabetes were welcome to select topics of interest and attend whichever and however many session they wished.

In Study 2, the participants were one CDE and two patients. The two patients attended two different group education sessions. The CDE and each patient were interviewed before and after a single group education session. There was no follow up education session as the group education series had a new topic for each education session.

Table 6.1. Study 2: Interview and data collection process

	Case 5: Patient E	Case 6: Patient F
	Interview before	Interview before
CDE 3	Group education session 1	Group education session 2
	Interview after	Interview after

Note. CDE = credentialed diabetes educator.

In this study, the CDE is referred to as CDE 3 and the patients are Patient E and Patient F. In the findings below, interview data from CDE 3 and Patient E is referred to as Case 5 and CDE 3 and Patient F is Case 6.

The findings are presented in the same format as the findings for Study 1 but with more focus on summarising the findings rather than repeating them in lengthy detail as in Study 1.

This chapter starts with the general comments for each case which includes descriptions of the participants, other group members and the context. Then the understandings of CDE 3 are presented in relation to the analytic frameworks used in Study 1. Finally the understandings of Patients E and F are presented in relation to their role, the role of the CDE, teaching and learning.

A summary of the findings for Study 2 is provided at the end of the chapter.

General Comments

Case 5

In Case 5 the credentialed diabetes educator (CDE 3) was providing education about using a blood glucose meter to Patients E and F and other people attending the group education session. Her role at the community education service involved teaching people with diabetes and significant others in 1:1, group and large community event type settings. At the time of the interviews, CDE 3 had been credentialed for more than five years and was actively involved in the peak professional body for diabetes educators.

Prior to starting the first interview CDE 3 was apologetic about the forthcoming education session. She was concerned about the PowerPoint presentation she was going to use stating that she had “planned to make changes but had run out of time”. CDE 3 also noted that she had not organised any feedback or evaluation forms for the session which she would normally do.

Patient E was a woman in her early 50s. She presented as very confident and commented that she knew a little about diabetes as her ex-husband had it. However, she noted that she had not been very involved in the management of his diabetes.

Patient E had participated in other research with the Australian CSIRO scientific research organisation, where she followed specific diet requirements for many weeks. It was during this research that she was diagnosed with type 2 diabetes and a problem with her thyroid function. This was five months prior to this education session.

The group for the education session was very small with only three other participants, one of whom was the partner of a person with type 2 diabetes. Patient E was active in the education session and asked questions throughout the session.

Case 6

CDE 3 was again the CDE presenting this new group education session. At the beginning of the interview before the group education session she laughed a lot as she realised she was answering the same questions but could not remember what she had previously said. She commented that she had managed to organise an evaluation for this session and was pleased that she was organised. CDE 3 also noted that she had made some changes to the PowerPoint presentation but had not had a chance to do a practice run through or to time it.

There were six people in this group along with three partners of people with diabetes. The group ranged in ages from early 50s to early 80s. This group had a very different “feel” to it and a general “buzz” in the room. The group were very active and asked many questions throughout the session. Patient F also participated and asked a question about how often to change the needle in the lancet, which she had identified as needing to know in the interview before the group education session.

Patient F was a woman in her late seventies who was a little nervous about “being able to answer questions correctly”. Patient F was also anxious about an issue related to her home and some time was spent reassuring her. Patient F was diagnosed with type 2 diabetes approximately six weeks earlier. She had recently attended a supermarket tour where she learnt to “read labels” on food. She talked extensively about her daughter who lived interstate and how important she was to her and how she assists her via the phone with discussions about managing her diabetes.

CDE 3 Understandings

The details below highlight the frequency of statements made by CDE 3 about general pedagogical knowledge (GPK), knowledge of learning, and content knowledge. A CDE who focuses on content is not unexpected. It is encouraging that

CDE 3 has provided frequent statements about GPK and learning. However, at this part of the analysis these are just statements about the presence of this knowledge, not its quality. But this does indicate that there is a body of knowledge about learning that the CDE drew upon in the interview which is encouraging.

The concern though is the low frequency of pedagogical content knowledge (PCK) statements made by CDE3. It is this knowledge that can be particularly important in helping the patient to develop a strong understanding and help them to negotiate difficult points in the blood glucose monitoring procedure.

Teacher knowledge categorisation

Figures 5.20 to 5.22 represent the findings of the teacher knowledge classification analysis for CDE 3 in Study 2. It is important to note that within this classification of teacher knowledge, each statement provided by the CDE participant has been attributed to all relevant categories. This means that each statement could be attributed to more than one category of teacher knowledge.

In Figures 5.20 to 5.22, the vertical axis represents the percentage of the total number of statements which were identified as demonstrating the type of knowledge in that category of teacher knowledge classification. On the horizontal axis, the categories for the teacher knowledge categorisation are listed. The CDE 3 statements for each of the two patients are presented separately and then in a table highlighting the averages.

In the interview before the group education session with Patient E, CDE 3 made more statements (high frequency) about general pedagogical knowledge than the other categories of teacher knowledge. As shown in Figure 5.20, CDE3 provided moderate frequencies of statements about knowledge of learning and content knowledge, and quite low frequencies statements in each of the other teacher classifications.

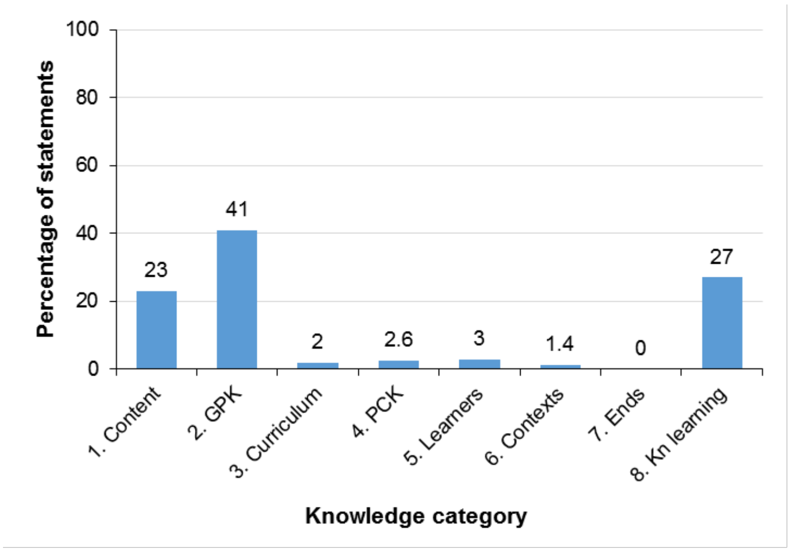


Figure 5.20. Percentage of statements (n=67) in knowledge categories CDE 3 Patient E.

Examples of GPK for CDE 3 include: “It is important they participate, ask questions, listen actively and are ready to respond” (Case 5).

CDE 3 also raised the importance of relationships in teaching and learning and stated that this can be more difficult in a group but it is important for the group members to “be comfortable in the group and with me. They need to form relationships to feel comfortable” (Case 5).

CDE 3 was able to talk about teaching and learning in the group context and commented on how groups can be different. CDE 3 also acknowledged the benefits of groups for the person with diabetes by stating, “groups can be good, its reassurance they are not alone”, and “the group shows people, others have had similar experiences which can be good” (Case 5).

CDE 3 also provided statements about her knowledge of learners in recognising that “those who don’t participate often don’t come back” (Case 5).

Examples of the content to be taught were used to describe her plans for the session.

> I’m not sure if I will get through all of the slides as there are a lot and it will depend on the group and what they already know about blood glucose monitoring. I go through the finger pricking, the different meters, how to prepare their hands, calibrating the machine etc. (CDE 3, Case 5)

CDE 3 also noted that some content may be left out of the group education content and provided in written format. However, this decision was made by the CDE during the education session and was dependent on how the group is functioning together, how they were progressing through what is identified as essential content, and whether or not the group members are deemed capable of following instructions on their own after the education session: “I give handouts at the end so anything I miss they can read about at home or make a time to see me 1:1 if they need to” (Case 5).

In the interview after the first group education session CDE 3 did not think the session went very well. She was concerned about the very small group and did not feel that the session flowed very well.

In the second group education session (Case 6) which included Patient F as a group member, CDE 3 was more positive because there were more people in the group. However, there was little difference in the profile of categorisation of her knowledge of teaching and learning as seen in Figure 5.21.

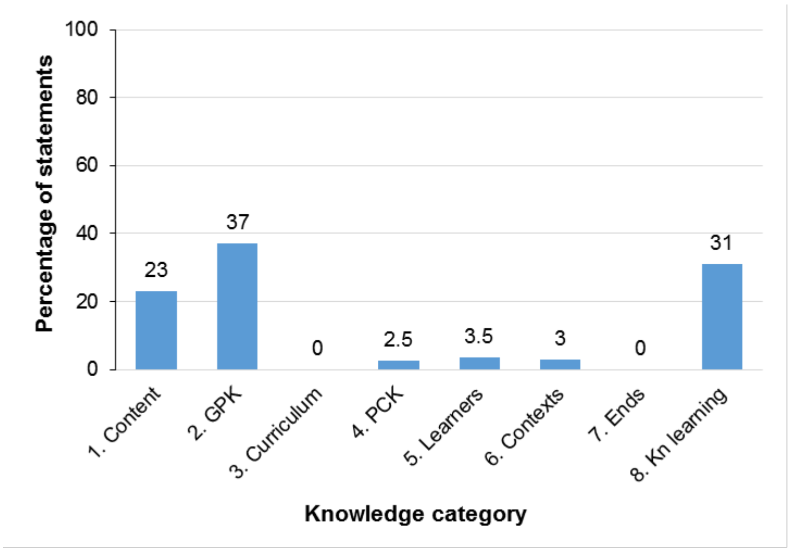


Figure 5.21: Percentage of statements (n=43) in knowledge categories CDE 3 Patient F

Again, the categories of knowledge most frequently discussed were general pedagogical knowledge (GPK), knowledge of learning, and content knowledge. There were no moderate frequency examples with all remaining categories showing low frequencies of statements.

In the interviews before and after the second group education session, CDE 3 provided the following examples of her GPK: “You need to ‘read the group’ and figure out the level to pitch the content, questions to pose to them to get discussion going and if they are fidgeting it’s time to take a break”. (Case 6)

CDE 3 also demonstrated her knowledge of learning by recognising the importance of assessing the group members’ knowledge and what they want to know first by engaging them through questions and discussion: “I start my group by asking them if they have any questions and I put them on the whiteboard. This helps to assess the group and focus on the purpose of them attending” (Case 6).

This practice of white-boarding group members’ questions was evident in the video of the education session. CDE 3 also commented on the importance of making group members feel comfortable and getting discussion going. She also noted that sometimes discussions can be problematic as they stray off topic and lose valuable time.

> I throw questions out to them all to get discussion going and make them feel more comfortable with each other. Sometimes though we get off track with questions and it is hard to get back to the topic. I just tell them I’ll talk to them at the break or to make an appointment. (Study 2, CDE 3, Patient F)

CDE 3 also noted that comfort for group members also involved the physical environment and she mentioned that the air-conditioning in summer was problematic so she was very conscious of watching attendees for signs of weariness.

Figure 5.22 presents the averages for each of the categories of teacher knowledge for CDE 3. from two different group education sessions.

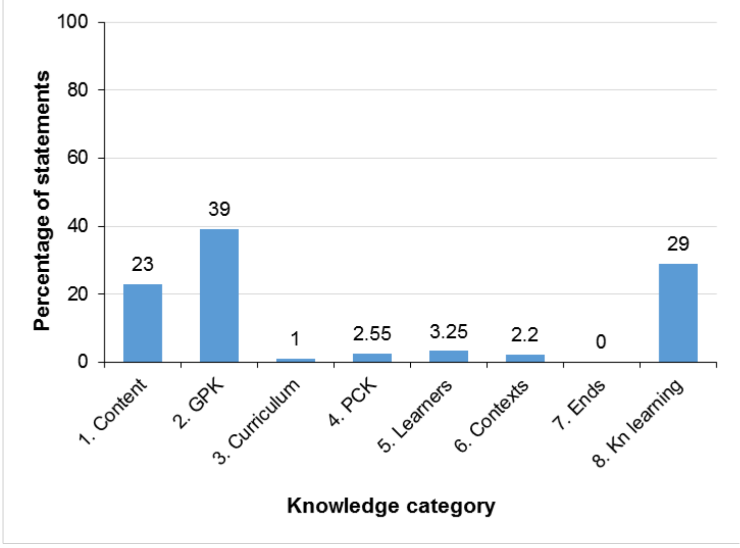


Figure 5.22. Average percentage of statements in knowledge categories CDE 3.

The low frequency of statements indicating her knowledge of pedagogical content knowledge (PCK) and learner characteristics is of concern and may relate to the education session being undertaken in a group rather than one-to-one. The low frequency of PCK statements raises concern because it is the knowledge a CDE would use to help the patient to develop strong understanding and guide them through difficult points in the procedure of testing blood glucose levels.

Learning Activity

When reviewing the understanding about learner activities described by CDE 3 the COATSRUAM framework was used to categorise the statements from the interviews.

The statements from CDE 3 provided examples of her knowledge in each of the categories of learner activity with the categories of context, analysis, management, and attention receiving the most frequent acknowledgement. It was encouraging that there was a moderate level of accessing of CDE 3’s knowledge about transformation and storage as these are processes that are critical for the learner in the process of encoding and representing knowledge for later use.

CDE 3 made fewer statements which were coded as utilisation, retrieval, and orientation which is of concern. Utilisation and retrieval processes involve accessing and using stored knowledge. It is how the patient will recall and use newly represented knowledge which is critical for use of the blood glucose meter, interpreting the readings and solving problems of daily diabetes management.

In Figure 5.23 the statements from the interviews with CDE 3 before and after the group education session which included Patient C have been analysed and the frequency of statements attributed to each category noted.

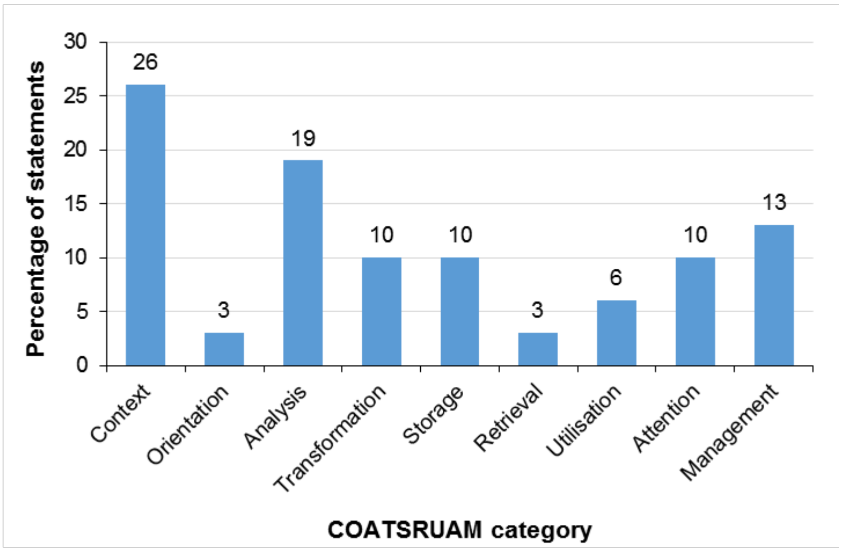


Figure 5.23: Statements (n = 31) in COATSRUAM categories CDE 3 Patient E

Figure 5.23 shows that CDE 3 provided statements most frequently in the categories of context (26%) and analysis (19%); moderate frequncy for transformation (10%), storage (10%), attention (10%), and management (13%); and low frequency for orientation (3%), retrieval (3%), and utilisation (6%).

The statements provided by CDE 3 in the interviews related to the group education session involving Patient E contained the largest number of statements attributed to the activity of *context* and *analysis* by the learner.

CDE 3 was conscious of considerations and changes to her teaching for group members to learn in a group setting.

> It is important to facilitate the group and form relationships so they feel comfortable to share personal information and ask questions (Study 2, CDE 3, Patient E).

CDE 3 was concerned about the number of PowerPoint slides and the sequence of them. It became apparent that she was concerned about how the sequence would be used by the group members to understand blood glucose monitoring.

> I'm not feeling good about this session. The slides are not mine and I think there are too many. I didn't get time to go through and change them. I hope it flows and makes sense for the group. I can't really change or skip as I go along as I don't really know the sequence that well. Hopefully I can answer their questions and help them work out all the bits they need to know. (Study 2, CDE 3, Patient E)

This idea that there were a lot of 'bits' of information the group members needed to know in blood glucose monitoring was also categorised under analysis as it was an example of how CDE 3 knew that the learner needed to understand the parts of the whole and construct them in a way that was meaningful to them.

In the second group education session, CDE 3 provided a similar spread of statements across the COATSRUAM framework. Again, *context* and *analysis* were the most prominent in her statements.

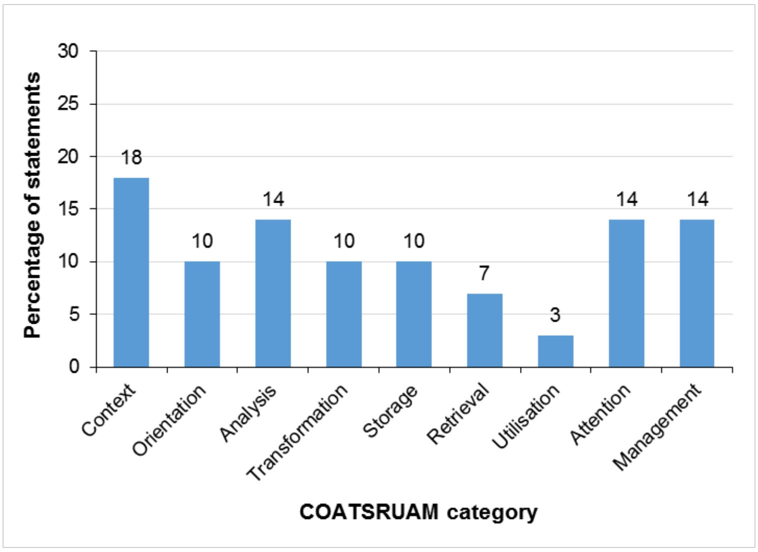


Figure 5.24: Statements (n = 29) in COATSRUAM categories CDE 3 Patient F

In Case 6 with CDE 3 and Patient F, Figure 24 shows that CDE 3 provided a more even spread of statements with the most frequent category of Context (18%). There was moderate frequency for analysis (14%), attention (14%), management (14%), orientation (10%), transformation (10%), and storage (10%); and a low frequency for retrieval (7%) and utilisation (3%).

In the second group education session, CDE 3 was concerned about the larger size of the group as this alters the context and adds complexity to the interactions, opportunities to ask questions and the content to be covered.

> I don't want to just give a lecture but it can be difficult to include everyone and keep on track when the group has more people (Study 2, CDE 3, Patient F).

CDE 3 was aware of the differences between individuals in a larger group and she commented on the need to keep the language appropriate and avoid diagnostic terms.

> The group is quite varied from what I know so I will need to think about the language I use to ensure it is right for everyone. The content can be very complicated if you use the diagnostic terms. (Study 2, CDE 3, Patient F)

CDE 3 was also noted to provide statements that demonstrated her understanding of all of the learner activities. Other categories of note were her recognition of the need for the learner to be focussed and pay attention for learning.

> I try to make it interactive and interesting because the slides can be dull, especially the ones with a lot of text. I also sue the whiteboard to draw diagrams which adds variety (Study 2, CDE 3, Patient F).

Figure 5.25 is a summary of the four interviews with CDE 3 before and after the two group education sessions. All categories are represented with statements about the Context and the steps within the content (analysis) provided most frequently.

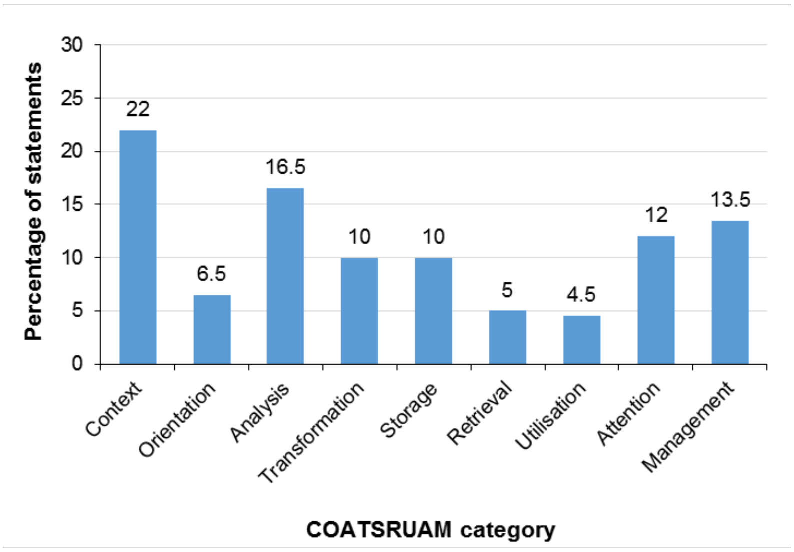


Figure 5.25: Averages of statements in COATSRUAM categories for CDE 3.

It appears from the CDE 3 interviews and video of the group education sessions, CDE 3 has limited knowledge about useful teaching strategies which can provide learning opportunities for different people in a group context. CDE 3 has a heightened awareness of the group affecting the context for learning and the need to provide information in parts of the whole (analysis) for different learners within the group. However, CDE 3 provided less statement's demonstrating her knowledge of how to assist learners within groups to recall or retrieve and use the new knowledge.

Quality

The 4-point quality rating scale was again used in the analysis of the statements made by CDE 3 in the interviews before and after the group education session involving Patient E.

In Figure 5.26 the majority (55%) of statements were rated at level 2 which means they were statements about teaching which included an example. CDE 3 also provided a high number of statements (40%) which included a justification for her teaching action. There were only a small number (4.5%) of statements which were considered general statements without explanation or justification. There were no examples of statements which were rated at the highest level of four as CDE 3 did not mention or provide any links to theory when discussing her understandings of teaching and learning in the interviews.

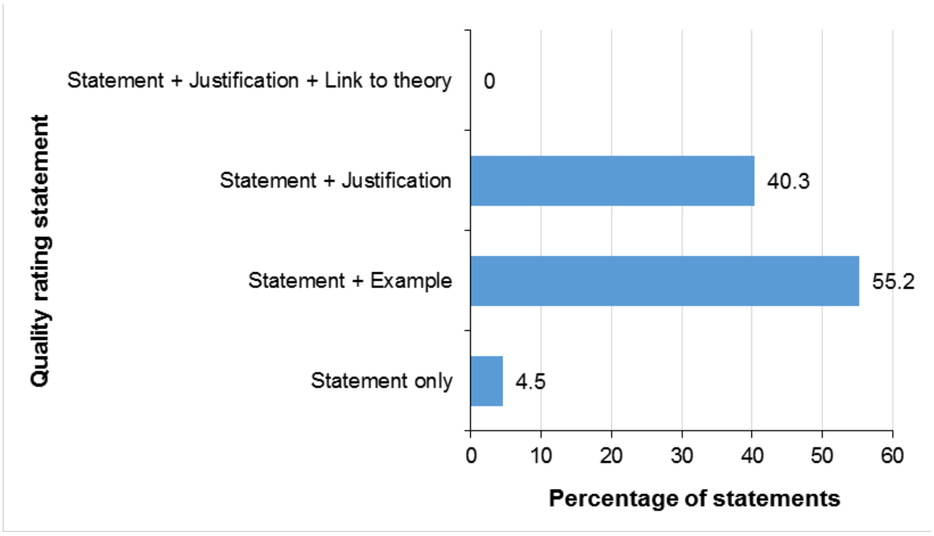


Figure 5.26: Quality rating of statements provided by CDE 3 in Study 2 in relation to education sessions with Patient E.

In these interviews around the group education session involving Patient E, CDE 3 has a lower quality rating than CDE 1 or CDE 2. The statements were most frequently at level 2 where she provides examples rather than theory or justifications as the means of explaining why the teaching was provided in a particular way.

The following is an example of a general statement provided by CDE 3 when asked about the role of the person in the group education session.

> Interact with each other (CDE 3, Patient E).

This is a very brief statement which is limited in both content and quality. A further example of a general statement was: “Group education can be very difficult” (CDE 3, Patient E).

When pursued on this point of “groups being difficult”, CDE 3 provided some higher quality level statements by explaining that groups can be difficult if they are not interactive and the smaller the group the less likely they are to be interactive. The last part of the statement also provides a justification for the preferred size of 12 and as such is rated as a level 3 quality statement: “This small group today could be okay but I prefer about 12 in a group. They are more interactive” (CDE 3, Patient E).

When asked about the importance of the group being interactive CDE 3 made the following statement that was rated as level 2 quality rating as it provided examples of what was meant by interactive but did not elaborate on how this assisted learning: “It is important they participate, ask questions, listen actively and are ready to respond” (Study 2, CDE 3, Patient E).

There were other statements suggesting that comfort was important for people to ask questions but the link to how this assisted learning was again limited and thus this statement was also rated as level 2: “If they are comfortable they will ask questions and then they will learn” (CDE 3, Patient E).

There were no statements provided by CDE 3 rated at a level 4 quality. This means there were no statements which identified or linked the general idea, example or justification to any theory about teaching or learning. There appeared to be a sense of knowing what was important but CDE 3 was unsure of the theory which underpinned her knowledge. An example of this was when CDE 3 said “I need to change the PowerPoint, take out the diet information for week 2. I would like to remove repetitive slides but repetition is good. I’m not sure about that, hmm I’ll have to think about that” (Study 2, CDE 3, Patient E).

In the interviews with CDE 3 before and after the group education session in which Patient F was a participant again she provided mostly statements that were rated as level 2. This means CDE 3 provided mostly statements with examples as seen in Figure 5.27 .

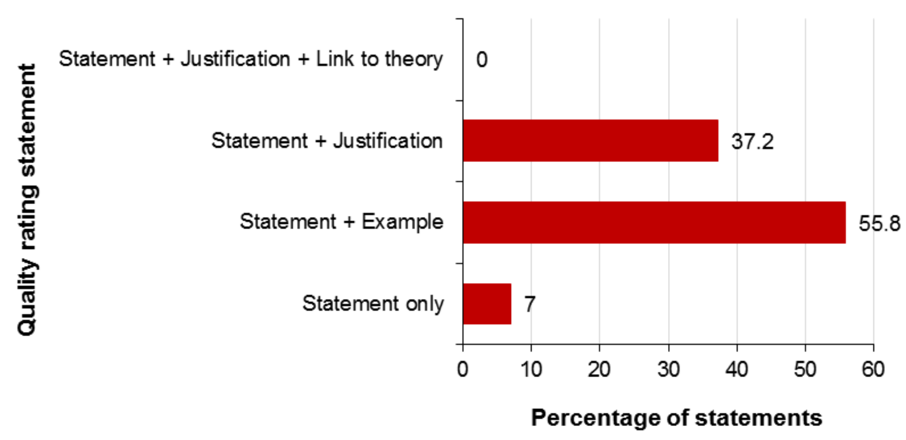


Figure 5.27: Quality rating of statements provided by CDE 3 in Study 2 in relation to education sessions with Patient F.

An example of a general statement made by CDE 3 during the interviews around the group education session with Patient F was, “I start my group by asking them if they have any questions and I put them on the whiteboard”.

This statement is simply a statement of fact about what happens. There are no examples or justifications. However, CDE 3 did go on to justify this general statement as seen in the following extract which is a level 3 rated statement as it provides a reason why she starts her group in this way: “This helps to assess the group and focus on the purpose of them attending” (Study 2, CDE 3, Patient F).

This idea of assessing the group was raised a number of times. CDE 3 also used the phrase “read the group” and when her understanding of this was pursued she suggestsed: “You need to ‘read the group’ and figure out the level to pitch the content, questions to pose to them to get discussion going and if they are fidgeting it’s time to take a break” (Study 2 CDE 3, Patient F). Here CDE 3 refers to the idea of assessing the group to ensure the content is suitable for all group members. CDE 3 mentioned this issue repeatedly which suggest it was at the forefront of her mind during group education.

Figure 5.28 is a combination of the quality statements made by CDE 3 in the four interviews with Patients E and F.

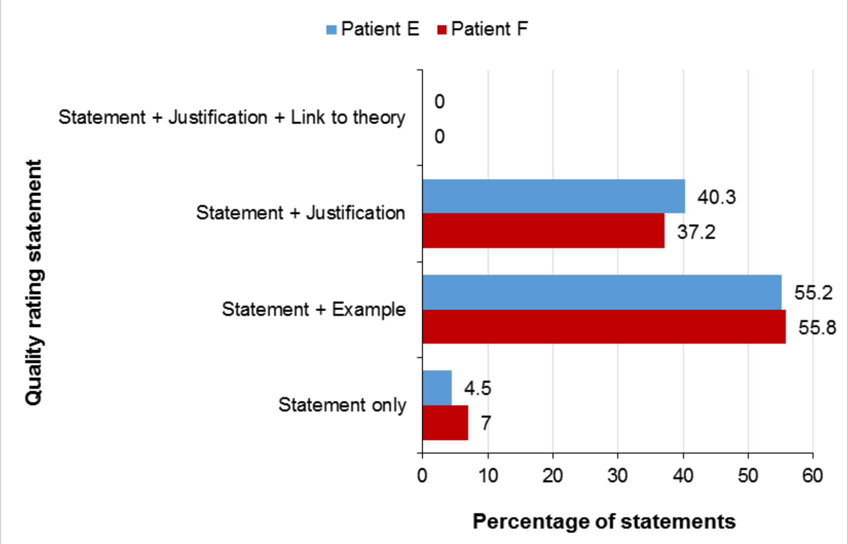


Figure 5.28: Quality rating of statements provided by CDE 3 in Study 2 in relation to education sessions with Patient E and F.

CDE 3 has a very similar profile across patients E and F with a greater proportion of statements at Level 2. The statements provided by CDE 3 are rated as lower quality than CDE 1 and CDE 2 and there was no evidence of any link to theory.

The statements provided by CDE 3 suggest that her focus was very much on the group and the constant tension between meeting the needs of individuals within the group and those of the group as a whole. It is likely that this focus was responsible for more level 2 statements about teaching with examples than level 3 statements with justification. There were no statements indicating that CDE 3 utilised any theoretical basis for her teaching strategies.

The absence of theory limits CDE 3 in her ability and options to produce effective teaching strategies which could respond to the individuals within the group in the context of a group learning environment. If CDE 3 had a coherent, well-developed model of teaching and learning she did not provide any examples of it in her statements.

In summary, the majority (60%) of statements rated as quality level 2 on the scale. This means that for around 60% of the statements that this CDE made about learning activity, the statements were not accompanied by a justification that pointed to the existence of a rich network of knowledge underlying the learning activities. There were no statements which made an explicit connection with a feature of contemporary theory of learning, with any technical language associated with learning.

An encouraging feature of this CDE’s profile is that about one-third of her statements involved some level of justification or pointing to implications of the activity for learning. The presence of these justifications in her discussion, point to a network of knowledge that could be further developed through exploration of theory of learning that would make her knowledge about learning activity more powerful.

The lack of level 4 ratings indicated that this knowledge was not a powerful as it could be, that she did not have the same depth of knowledge about learning that would be expected to characterise her knowledge of diabetes and its management. There was no extensive evidence of the technical vocabulary of learning that paralleled the technical vocabulary of diabetes.

The following section in this chapter presents the initial analysis of the interviews which was designed to look for recurring themes. The recurring themes were then grouped under the headings of understandings about teaching, learning and the roles of the diabetes educator and the role of the patient. The understandings about the CDE and patient roles are presented first as they influence the CDE views and beliefs about teaching and learning.

Theme Analysis

In this initial analysis of the interviews with CDE 3 her understandings about her role were very clear.

Understandings about the CDE role

Case 5

When CDE 3 was asked about her role she was clear that she was a facilitator. When explaining what this meant she said, “help them to learn what they have come to learn”.

Essentially, CDE 3 understood her role was to facilitate their learning by working with them to meet their learning needs. She believed her role was to facilitate the group and to help them learn. Her idea of facilitating the group was based around helping them feel comfortable as she believed this aids learning.

> Facilitate the group – comfortable in the group with me, I will need to ‘read’ the group (CDE 3, Patient E).

She also identified the need to “read” the group which when pursued was understood to mean that she would “watch their body language, are they glazing over, do they need a break” (CDE 3, Patient E).

This understanding suggests that her role involves monitoring the group members and their levels of attention. CDE 3 also noted that the series of group education sessions can be problematic because each session has a different topic and participants can choose to attend any or all session in any of the repeating series. This means there is little or no opportunity to revisit information from previous sessions or add content missed from a previous session. CDE 3 mentioned her concern of overloading the session with content in an effort to cover the planned topic and answer questions members of the group bring with them.

> Overloading is a big issue as next session is a different topic (CDE 3, Patient E).

Whilst this is an element of teacher knowledge about learning, CDE 3 saw this monitoring of the group and the content as an important part of her role.

Case 6

In the interviews with CDE 3 before and after the group education session with Patient F, CDE 3 provided similar ideas about her role. However, this time she provided more detail about her understandings. Again, CDE 3 identified her role as that of a facilitator: “someone who provides them hopefully answers to their questions and provide information about their diabetes and blood glucose monitoring. Focussing on these areas and answering their questions”.

When her understanding of a facilitator was pursued CDE 3 again identified a controlling role with a responsibility to answer questions and ensure group comfort.

> Facilitator – being organised as in setting everything up, getting things ready, keeping an eye on the time, read the group, their needs, ensuring that you are answering any questions, finding out what they are there for. Be aware of those in the groups, chatting with each other, trying to assess the needs of the group, comfort, air conditioning. (Study 2, CDE 3, Patient F)

The idea of “reading the group” was raised again and when pursued a similar response was forthcoming: “if people fidgeting with their feet, sign that you need to take a break, if dozing off sometimes this happens with people with diabetes with a lack of exercise” (Study 2, CDE 3, Patient F).

However, CDE 3 went on to explain that in this first session in the series her role was a little different and involved some lecturing while she assessed the group and where to pitch the ‘talk’.

> In this first week in this session I find you tend to lecture a lot and not integrate with the group, assess their knowledge a little while in the group, bit to work out where to pitch the talk.
> (Study 2, CDE 3, Patient F)

CDE 3 then went on to describe that assessing the group and getting the comfort right was important so she could get discussion going. She explained why discussion is important in this following extract.

> Trying to get discussion going – I think discussion can sometimes um can work both ways, some people don't feel comfortable to say what they want but it helps the group feel comfortable, in discussion you might get out things from people or at morning tea time you might get them to ask things, it helps particularly in the newly diagnosed groups. (Study 2, CDE 3, Patient F)

CDE 3 thought that identifying the level at which to pitch the talk was important and she used their language, questions and any books they brought in as ways to assess their level of understanding and a guide to the level she would pitch her 'talk'.

> Where to pitch it – their language you can get a bit of an idea and have a sense of where they are at, they may bring in books, sometimes their questions are beyond where a newly diagnosed person would normally be. (Study 2, CDE 3, Patient F)

In the interview, her understanding about her role was again pursued to check if "facilitator" was the main idea, now that she had introduce the use of discussion. CDE 3 also offered the idea that she was a presenter. However, she did not extend this but rather suggested when she is out and about in the community doing public talks it is more like a lecture, but in the group sessions she is like a presenter of information.

> presenter, I was going to say lecturer but I think that's more when you are out, here you are just out there talking (Study 2, CDE 3, Patient F).

There was no more detail about this idea of her role as a presenter. When pursued through questions about the terms she uses to describe herself her response was: "I usually say I'm a nurse and diabetes educator" (Study 2, CDE 3, Patient F).

She went on to say that she usually introduces herself to the group using her name rather than her role, but thought the terms were more relevant in the one-to-one session she undertook.

> I think about those roles in terms of what you do, more in 1:1, its more general in groups so I probably don't use them (Study 2, CDE 3, Patient F).

In summary, it was difficult to clarify the CDE's understandings about her role, the use of specific terms to describe her role, and her reasoning behind labelling the role differently in changed circumstances.

Understandings about the Patient role

Case 5

CDE 3 provided limited responses about the role of the patient in the interviews before and after the group education session with Patient E. Her understanding about the role of the patient was focussed on learning in a group.

> Come with questions and ask during the group (CDE 3, Patient E).

She was quite 'matter of fact' and assumed that the people attending the group would "want to learn about their diabetes management" (CDE 3, Patient E).

CDE 3 identified that their role was active and involved being ready to respond to her questions.

> Active listening and ready to respond (CDE 3, Patient E)

CDE 3 was very keen for the group members to interact with each other.

> Interact with each other. People who don't interact often don't come back (CDE 3, Patient E).

When the importance of interaction was raised CDE 3 noted that groups are not for everyone and those who don't interact often don't come back.

When pursuing the CDE's understanding about the role of the patient further, CDE 3 was asked about her expectations of the patient in-between the sessions. CDE 3 was somewhat surprised by the question and noted there were "no expectations between sessions because sessions are different and probably a different educator in next session" (CDE 3, Patient E).

Again the role of the patient was sought in terms of the labels or terms used to describe them. CDE3 identified that she had not thought of them as students or learners but did suggest that they probably are.

> I've not previously thought of patients as students or learners, (Laughs) but I guess they are really (CDE 3, Patient E).

When the CDE was asked for further thoughts she was unable to expand about their role as learners or students other than to say

> Its funny but I've really not thought about the people in groups like that. Even the public when I do those sessions. I would if it was a group of nursing students though (CDE 3, Patient E).

This example of how CDE 3 thinks about the group education sessions suggests she is preparing more for information provision rather than individual learning.

Case 6

In the interviews with CDE 3 surrounding the group education session involving Patient F her description of the patient role was more focussed around learning.

> Hopefully to get the outcomes of what they came to achieve or a confirmed knowledge depending on what knowledge they came with (CDE 3, Patient F).

CDE 3 again raised the importance of patients being comfortable and linked it back to learning rather than their role.

> To feel comfortable, I know if I'm comfortable in a group, I'm more engaged (CDE 3, Patient F).

CDE 3 then went into detail about the physical comfort issues and explained that they have been having trouble with the air-conditioner which was a significant issue as it was in the middle of a hot summer.

> Comfortable – air conditioning, fanning themselves, lighting, writing on board, colour of pen (CDE 3, Patient F).

In an attempt to get back to the understanding about the patient role held by CDE 3 she was asked what terms or labels she used to describe them.

> No terms, group that's all, (CDE 3, Patient F).

When terms such as patient or people was suggested she was clear that she did not use the term patients as they were in the community and that she used "people and partners" (CDE 3, Patient F).

Understandings of Teaching

Case 5: CDE 3, Patient E

In the first interview before the group education session with Patient E, when asked about what she thought teaching was she replied, "helping someone, patients or carers with diabetes" (CDE 3).

CDE 3 also mentioned that helping someone can be about more than just teaching and that it can also be about reassurance.

This suggested a level of concern for the personal or attitudinal level of comfort experienced by group members. CDE 3 went on to say that in terms of teaching, group education can be difficult because of the multiple needs among different personalities: "Group education can be very difficult. It can be easy to get off track with questions sometimes" (CDE 3).

CDE 3 identified that questions were an integral part of teaching along with the use of drawings on the whiteboard for visual learners.

Other teaching strategies CDE 3 talked about included handouts, although she then corrected herself and noted she had forgotten to give them out. CDE 3 said she did not like giving pamphlets out at the beginning of the session as some people sit and read them and then do not listen.

> I give handouts at the end so they listen and participate rather than just read them in the group. Oh I just realised I forgot to give them out (Study 2, CDE 3, Patient E).

CDE 3 also noted that repeating information through links to the other topics is something she tries to do but it does not always work in groups, especially when she doesn't know the group members well.

> Reinforcement, go through things again. Link to other topics they may have done (Study 2, CDE 3, Patient E).

Other teaching examples provided by CDE 3 was the use of other cases she had had been involved in to show strengths and issues for people to consider that may be relevant to their situation.

> Give case examples from past patients (Study 2, CDE 3, Patient E).

However, CDE 3 did not use this approach in the group education session involving patient E. After the education session CDE 3 said she did not think it went well. She identified too many slides in the PowerPoint presentation as an issue for teaching.

> I need to change the PowerPoint, take out the diet information for week 2. I would like to remove repetitive slides but repetition is good. I'm not sure about that, hmm I'll have to think about that (Study 2, CDE 3, Patient E).

CDE3 also commented on the limited interaction but felt it was because of the small group. However, she did think that sharing experiences was good, even if limited.

Case 6: CDE 3, Patient F

CDE 3 again focussed on the issues of patient or learner comfort when asked about her understandings of teaching. It may be that she felt a little hot and stressed as she was being video-taped.

> Hot and stuffy room, need to look at air conditioner, colour of pens on whiteboard not good (Study 2, CDE 3, Patient F).

She also noted the colour of the pens on the whiteboard were important in teaching as she had difficulty in this session with white board pens which were difficult to see.

CDE 3 also commented on the use of rows in the group education room and identified that it would be better if participants sat in a circle.

> Sit in a circle not rows when a smaller group like this (Study 2, CDE 3, Patient F).

However, she did not explain why this was important for teaching. Instead, she went on to talk about how she doesn't know the group members before meeting them in the group education session. CDE 3 did not elaborate on how that was important to her teaching.

> I don't know them before they come. The logistics of booking means we don't know them. We are introducing a new system soon to focus in more on what they think they are coming for (Study 2, CDE 3, Patient F).

The statement above suggests that her preference for a booking system is to determine the learning needs of those attending the group education session. Potentially the diabetes educator leading the group could then ensure individuals learning needs are met or people could be redirected to a more appropriate group education session.

Understandings of Learning

Case 5

When asked about learning, CDE 3 was quick to note that she thought group education was difficult for learning and the size of the group affected the interactivity which was important for learning from her perspective.

> Group education can be very difficult. This small group today could be okay but I prefer about 12 in a group. They are more interactive (Study 2, CDE 3, Patient E).

CDE 3 went on to suggest that the use of their own meters in the group would be good as it would be hands on and more interactive. However, there were no plans to ask participants to bring their meters to the group via the information brochures or booking phone call conversations.

> Better if they have their meters, more hands on then. A bit, monkey see, monkey do (Study 2, CDE 3, Patient E).

CDE 3 seemed a little concerned about how to action this idea in a group with the potential for many different meters and as many as 15 people using sharp implements at the same time. Again, CDE 3 mentioned the importance of comfort to encourage participants to ask questions.

> If they are comfortable they will ask questions and then they will learn (Study 2, CDE 3, Patient E).

CDE 3 also went on to say that the questions were important for learning because they help the person with diabetes to learn and clarify their understanding.

> Answering questions helps to learn and clarify (Study 2, CDE 3, Patient E).

CDE 3 did not elaborate on this point of how answering the question helps the person to learn and did not indicate any understanding about how the learner constructs their knowledge networks.

Case 6

In the interviews for the second case of group education with Patient F, CDE 3 was clear that the patient needed to arrive with a positive attitude towards learning which she thought could be shown by interactivity and participation in the group.

> They need to be interested in being educated by taking brochures, asking questions about next sessions, listening to others in the group, etc (Study 2, CDE 3, Patient F).

CDE 3 identified that participants often take notes to assist their learning and she is conscious of not talking too fast when she notices them writing down a lot of information.

> Taking notes is good, but then I try not to talk to fast (Study 2, CDE 3, Patient F).

Again, CDE 3 mentioned the idea of breaking the group into smaller groups but identified she is still struggling with how to do this.

> Thought about getting them to go off in groups but haven’t quite worked that out (Study 2, CDE 3, Patient F).

It is possible that CDE 3 is unsure of the benefits of small groups and the purpose of the activity for learning which is blocking her ability to design an effective small group activity.

Patient Understandings

Patient E

In Study 2, one patient from each group was also interviewed before and after the group education session in which they were involved. This provided an opportunity to collect information about patient understandings related to teaching, learning, the role of the CDE and their role in the group education session. Key words relevant to learning are highlighted as examples from patient interview data.

Understandings about the CDE role

When Patient E was asked about the CDE role she provided a number of different ideas. Firstly, Patient E focussed on the content of the group education session and identified that her role was to explain the blood glucose monitoring.

> To explain diabetes and blood testing – when and how (Patient E).

Patient E believed that the CDE needed to know the content well “to know the subject well” and she thought it would be good if the CDE had diabetes too. This idea of a CDE having diabetes was raised by other patient participants in Study 1 and is an interesting point of view in terms of teaching and learning.

Patient E also noted that CDE asked questions and checked her understanding in the group education session which she identified as part of the role of the CDE.

> Encouraged questions and checked our understanding (Patient E).

In addition to this idea of asking questions, Patient E also thought that the role of the CDE was to be able to answer questions and as such was seen as a source of information.

> Able to answer questions (Patient E).

When this understanding was pursued it became apparent that Patient E expected the CDE to have all the information the patients need to manage her diabetes. An example of this was when Patient E noted that the role of the CDE was to “provide mechanics of issue”. This suggests that Patient E also understood that there are parts or steps within things she needs to learn.

Understandings about the patient role

In keeping with this idea of the CDE role being a source of information, Patient E also viewed her own role as having some responsibility for learning. Specifically patient E thought it was her role to make sure she understood what the CDE was saying.

> Make sure I understand – ‘really know’ (Patient E).

As a means of making sure she understood, Patient E was clear that it was important in her role to listen to the CDE and to others in the group. This idea that the CDE is not the only source of information was elaborated on when Patient E identified that it was her role to “participate because it adds value to the session”.

Patient E did not elaborate on how participation added value to the session other than to reiterate that you can learn from others. Patient E did however, also joke that it was her role to “stay awake”. This idea, whilst mostly a joke, did also identify that she knew learning was somehow related to being able to listen and perhaps pay attention.

Understandings of Teaching

In the interview with Patient E before the group education session, CDE 3 explained her understandings about teaching in a similar way to how she explained the role of the CDE. Patient E suggested that teaching is when “the educator would explain and apply information”.

Patient E also noted that teaching was active and should involve “activities, be hands on, graphic like the supermarket tour”. Patient E identified strongly with the supermarket tour as a positive teaching and learning experience. Patient E also noted that teaching was not only done by the diabetes educator but that others in the group could also teach: “Like to listen to others and learn from others too”.

However, Patient E was particular about the need for teaching to be planned and organised. This was an attribute of the supermarket tour that she liked and suggested that all teaching need to contain these elements.

> Organised and kept on topic (Patient E).

As noted above, Patient E provided explanations about teaching which could easily be considered explanations about learning as well.

Understandings of Learning

When Patient E was specifically asked about learning she identified a number of features many of which reflect a level of responsibility to learn by the learner (patient): “Ask lots of questions”.

Initially her responses were brief but with further prompting Patient E provided more detail. An example which carried on from the idea of asking questions was when she noted to learn she would “seek out others with same problem”.

Patient E also identified that both listening and reading was useful for learning and specifically suggested books as a source.

Again, the idea of activity for learning was proposedwith the specific suggestion that it had a role in reinforcing learning: “Seeing the meter reinforces learning” (Patient E).

When this idea was pursued Patient E did not offer any more understandings about learning in relation to reinforcing but rather went on to describe how understanding was important for learning: “Educator checked our understanding. Not helping to learn but checking our understanding”.

It was difficult to clarify the apparent difference Patient E saw between learning and understanding but in pursuit of this clarification she offered the following: “Learning is gaining knowledge about something. It is accepting the information. Understanding is better”.

It appears that Patient E believes that understanding is better but was not able to explain how it is better or how it is different to learning other than it is more than merely gaining knowledge.

Patient F

Patient F was an older woman who was a little anxious about “being able to answer my questions correctly” and managing her diabetes correctly.

Understandings about the CDE role

Patient F was clear about the role of the CDE and allocated significant responsibility to the CDE to direct her to the right way to manage her diabetes. She was also interested in knowing what the diabetes could do to her and appeared to understand the link between effective management and complications.

> I’m hoping she will put me on the right track and tell me what diabetes is and what it will do to me (Study 2, Patient F).

Patient F also noted that the CDE role did this through explanations and again linked it to prevention and management of her diabetes.

> She tries to explain what diabetes is, what to do to help prevent or maybe not prevent, control (Study 2, Patient F).

The CDE role of teaching was also evident from the supermarket tour which was a positive experience for Patient F. Using her experience of the supermarket tour, Patient F recalled that she was taught and identified the supermarket tour as an example of how she had learned about reading labels.

> On the supermarket tour she taught me about reading labels, very, very helpful, now I know what to look for, don’t even walk down the biscuit isle (Study 2, Patient F).

Implicit in the above explanation of what happened on the supermarket tour is the idea that the CDE role is about teaching. In addition to this idea is the idea that teaching also involved ‘giving clues‘ on how to manage her diabetes.

> It is about “Living Well” so I’m hoping she will give me clues on how to do this (Study 2, Patient F).

When this idea of ‘giving clues’ was pursued it was not clear how the CDE was expected to do this despite a prior example of

> now I know what to look for, don't even walk down the biscuit isle (Study 2, Patient F).

Further questioning about this led Patient F to revert back to a more directed approach to teaching being about the CDE telling her what to do. However, the following statement is also interesting as it leads into Patient E's understanding both of the role of the CDE and that of a teacher.

> Probably is a teacher because I want her to tell me what to do (Study 2, Patient F).

The understanding of a teacher as noted in the above statement suggests Patient E believes teachers are responsible for directing the learning. It also implies that learning is about doing what you are told to do. This view is not congruent with the adult learning environment and self management approach promoted in Diabetes education.

Understandings about the Patient role (Patient F)

Patient F was not confident about her role but thought her role was to listen and be active in that she needed to take it all in and participate.

> To listen, take it all in, participate, I don't really know (Study 2, Patient F).

When asked further about listening she was clear that listening helped. Patient F also noted that she had a responsibility to undertake what she had been told to do and that this was a form of participation.

> Listening helps. Taking it all in and carrying the instructions out (Study 2, Patient F).

When the idea of participation was pursued, Patient F also noted that participation in terms of her role was to ask questions, although she was unsure what to ask.

> Perhaps maybe ask questions. Hopefully she will say are there any questions. I'm not sure what to ask, maybe about food and exercise, I don't know (Study 2, Patient F).

In the group education session Patient F did ask a couple of questions about how when to change the needle in the finger pricking device.

After the group education session, Patient F identified what she had been taught about using the meter but also suggested that content not covered (foods to eat) was her responsibility to learn.

> taught me how to use the little blood monitor, never suggested what foods or anything, but you need to work that out for yourself (Study 2, Patient F).

This perception of her role being related to teaching herself content that was not taught is interesting. Patient F had wanted to be taught more about food in the group education session as she associated food with ‘living well’ – the title of the group education session. The absence of this content led her to understand that she must have to work that out for herself (about the food), despite having undertaken a supermarket tour. This understanding also suggests she accepts some responsibility for her learning and that learning involves ‘figuring things out’ or possibly problem solving.

Understandings of Teaching

In the interviews with Patient F she was more confident to talk about her thoughts of teaching. Initially she said;

> It’s about getting it across to others (Study 2, Patient F).

When her understanding of this was pursued further she was more specific and suggested you need to be proficient at whatever it is you are teaching.

> Teaching another person a skill, something you are proficient at, getting it across, there are good teachers and bad teachers (Study 2, Patient F).

A further example of her perception that you need to be proficient at what you are teaching is seen below.

> I’m a dressmaker, anything with dressmaking I can teach, I like cooking and I like gardening, I can teach people but I’m not that good (Study 2, Patient F).

Patient F also recognised that there are different types of teachers and not all are good. She gave herself as an example of not being a good teacher when describing how she teaches dressmaking – a skill she believes she is proficient at and can teach.

> I'm a dressmaker, anything with dressmaking I can teach, I like cooking and I like gardening, I can teach people but I'm not that good - I'll ask them just to buy a simple pattern first, get their material and I'd put them on the right path, probably, I'd probably be doing it, its happened so many times, which I shouldn't, (Study 2, Patient F).

When asked to explain why she would 'probably be doing it' and why she 'shouldn't' she suggested that it was

> because I'm probably too impatient, they're too scared, (Study 2, Patient F).

Patient F identified patience as a quality of good teacher from her perspective but also acknowledged that some learners can be too scared to learn effectively. These understandings were then pursued in terms of how she would like to be taught and her learning about diabetes.

> If you are struggling you don't want someone to step in and help I'd rather make my own mistakes, because you learn by your mistakes, don't you, you learn I'll never do that again (Study 2, Patient F).

Interestingly, patient F has knowledge about teaching and learning but also has examples of she does not put this into practice when she is the teacher.

Understandings of Learning

In the interviews with Patient F her understanding of learning were sought and she offered a range of thoughts. Initially, Patient F was clear about her definition of learning.

> Absorbing and remembering, remembering what we've been told and act on it (Study 2, Patient F).

Again, Patient F indicates learning is active. When asked what she does when she wants to learn something, Patient F was very clear that it involved the need to;

> Persevere, and having the determination to put it into action, I am a determined person, reading, listening (Study 2, Patient F).

When Patient F was asked further about reading and listening she provided the example of learning about gardening.

> I listen to the radio and read gardening books (Study 2, Patient F).

Patient F was asked how reading helped her to learn but did not provide sufficient detail as she admitted that reading was not her preferred learning style.

> Never really been a great reader, unless I really want to read something and then I can't put it down, more of a worker than reader (Study 2, Patient F).

The statement above indicates that Patient F prefers to learn through doing rather than reading and would explain why she found the supermarket tour such a positive learning experience.

Patient F also identified a level of responsibility for learning when she noted that the CDE "never suggested what foods or anything, but you need to work that out for yourself".

This indicates that Patient F recognises that she won't be given specific foods or meal plans but rather she will need to develop these from the information provided. This is indicative of a problem solving approach to learning and one which would be encouraged in self management of diabetes care.

Study 2 Summary

Study 2 was focussed on the understandings of both the CDE and the patient in relation to teaching, learning and their respective roles in the context of group education. The study involved CDE 3 in two group education sessions and one patient from each of these groups was interviewed about their understandings of teaching, learning and their role.

CDE 3 was not pleased with her PowerPoint presentations nor her teaching performance in the group education sessions and thus many of her interview statements were on these issues and the difficulties she faces in group education. CDE 3 provided statements which reflected a reasonable knowledge of teaching, learning and learner characteristics according to Shulman’s (1986a) classification of teacher knowledge. CDE 3 also demonstrated some understandings of each element of activities to be undertaken by patients for learning. Her knowledge of learner activity was more prominent in the content and steps involved in the learning of blood glucose monitoring. However, the quality of both categories of knowledge was limited when analysed using the quality rating scale.

The quality of the understandings held by CDE 3 was limited by predominantly statements with examples. There were no statements linked to theory and few linked to justifications of her teaching actions. These limited understandings about teaching and learning were evident in her dissatisfaction with her group education sessions and the inability to know how to change her practice to improve the effectiveness of the group education sessions.

CHAPTER 7

FINDINGS: STUDY 3—EMAIL INTERVIEWS OF CDES

Introduction

This chapter presents the findings for Study 3 in the same format as those for the previous two studies.

In Study 3, twenty-two CDEs participated in two rounds of email interviews about their understandings of teaching and learning, their role as diabetes educators, and that of their patients in education sessions about blood glucose monitoring. There were no patient participants in this study.

The collection of data via email interviews included initial information (as shown below) about the participants' primary profession, a check to ensure that they offered 1:1 education to adults with type 2 diabetes, and reports on the time they allocated to the education sessions for blood glucose monitoring.

Question A:	What is your primary profession? (eg: Nursing, Dietetics, etc)
Quesiton B:	Please answer Yes or No
	Do you provide one-to-one education (1:1)?
	Do you provide Group Education?
	Do you provide education for adults with type 2 diabetes?
Question C:	Tell me about the time typically allocated to blood glucose monitoring in your work (eg: 2 x 45 minute sessions, 1hr group ed + 30 min 1:1).

The specific interview questions were limited to six in number to avoid 'scroll death' in this email message format and the waning of participant interest in the project. The six questions sought the CDEs' understandings about teaching, learning, the CDE role and the role of the patient. The six questions in the first round email were the same for all participants, as shown below.

Question 1: Imagine you are about to run an individual session on Blood Glucose Monitoring (BGM) for a person recently diagnosed with type 2 diabetes. What is your role in working with this person in this session on BGM?

Question 2: Again, imagine you are about to run an individual session on Blood Glucose Monitoring (BGM) for a person recently diagnosed with type 2 diabetes. What is the role of the person in this session on BGM?

Question 3: When running an individual session on Blood Glucose Monitoring (BGM) for a recently diagnosed person with type 2 diabetes, tell me how you will teach the person about BGM.

Question 4: Tell me how the person with Type 2 diabetes will learn about BGM?

Question 5: What are the most important things you will do as a diabetes educator to help this person learn effectively in this session?

Question 6: What are the most important things the person must do in this session to learn effectively?

The second round of interview questions for the participants pursued a word or concept raised by the particular CDE in the first interview response. This process was designed to simulate a face to face interview and explore the CDE's understandings further. However, there was more limited possibility of probing of the understanding of these CDEs in this format.

General Comments

Descriptions of CDE Participants

The following table describes the CDE participants in terms of their professional background, delivery of diabetes education and location across the states of Australia. Whilst the final sample in this third study was not a representative sample of the CDE population in Australia it did provide a broader base for examining the understandings of CDEs about teaching and learning than in Studies 1 and 2.

Table 7.1. Participant primary profession, delivery of education and location.

Participant information	Number (N = 22)
Primary profession	
Nursing	20
Dietetics	1
Pharmacy	1
Education provided	
One-to-one	22 (100%)
Group	17 (77.27%)
Location	
New South Wales	6
South Australia	6
Victoria	4
Western Australia	3
Queensland	2
Tasmania	1

The high proportion of nurses in the sample reflects the general level of representation of nurses within the Australian Diabetes Educators Association (ADEA) who are Credentialed Diabetes Educators (CDEs). All participants provided one-to-one education (1:1) to adults with type 2 diabetes. A large proportion of the participants (77%) also provided diabetes education in group environments.

Participants were also asked about the time allocated in a typical diabetes education session to teach a person about blood glucose monitoring. Examples of possible time allocations were provided with the question *(e.g., 2 x 45 min sessions, 1 hr group ed + 30 min 1:1)* and this appeared to prompt the CDEs to also provide information about group education sessions. Thus in answering this question many participants provided information about the time allocated for both 1: 1 and group sessions. The answers, summarised in Table 7.2, were wide ranging in terms of their detail for time allocation for initial education, follow-up education, or activities such as telephone calls.

Table 7.2. Time allocation for one-to-one blood glucose monitoring education

Time allocation	Initial teaching (N = 22)	Comments related to initial teaching	Follow-up session (N = 22)	Comments related to follow-up session
15 min			1 (4.54%)	
15–20 min	1 (4.54%)			
20 min	2 (9.09%)	For newly diagnosed (CDE 15)		
15–30 min	1 (4.54%)	Extra if needed (CDE 20)		
30 min	8 (36.36%)	Flexible (CDE 10) Depends on person – CALD etc. (CDE 21)	5 (22.72%)	
30–40 min	1 (4.54%)			
40 min	1 (4.54%)	Unless elderly or a problem then longer (CDE 7)		
45 min	2 (9.09%)			
60 min	4 (18.18%)	Up to 1 hr, repeat if needed (CDE 22)	2 (9.09%)	As needed (CDE 12) If needed (CDE 22)
	2 (9.09%)	Review of technique only. Taught elsewhere.	2 (9.09%)	Pt demo follow-up as needed (CDE 5) Periodic review (CDE 18)
			1 (4.54%)	Discussed. Time depends on client needs.
			9 (40.9%)	No response
			1 (4.54%)	Telephone or GP or 2nd appt if needed (CDE 21)
			1 (4.54%)	Other follow-up

Note. CDE = credentialed diabetes educator; CALD = culturally and linguistically diverse.

In this group the time allocation for blood glucose monitoring (BGM) education ranged between 15 min and 1 hr for 1:1 education sessions, with the most common session length being 30 min (n = 8). Some CDEs offered sessions greater than 40 min (n = 4) and some 60 min sessions (n = 4). Whilst there was no specific request for information about follow-up, a number of respondents identified the time allocated for follow-up as well.

Common among this group of CDEs was the acknowledgement that BGM would be discussed at other times and the time allocated would depend on the client's needs. Specifically, the CDEs noted that extra time was required if the patient was elderly or came from a culturally and linguistically diverse (CALD) background.

A further 5 (23%) participants stated that they allocated an additional 30 minutes for follow-up of BGM education. Interviews conducted in Study 1 would suggest that this follow up time is used to check technique and provide education about equipment purchases, warranties and sharps disposal issues.

In Table 7.2, it can be noted that 2 CDEs identified that they were not involved in the first line education of the use of a meter. In these situations, clients would purchase a meter from a pharmacy or other source and were then instructed in its use at the time of purchase. The role of the CDE in these cases still involved teaching and so the focus on teaching and learning was maintained. The CDE role specifically involved a review and assessment of the patient’s monitoring technique and associated knowledge, correction of any misconceptions and then reinforcement of their knowledge and understanding about the important elements of blood glucose monitoring.

> I normally deal with the “theory” of blood glucose monitoring and the local Diabetes Australia sub-agent (a chemist) sells and demonstrates how to use the monitor. I would spend approx 15 mins watching the client show me how they take their BGL and reinforcing correct technique. Obviously this time is variable depending on clients’ capabilities i.e. age, mental and physical ability and language barriers. Usually about two 30min individual sessions on total BGM initially. (Study 3, CDE 5)

Interestingly, one of the CDEs who allocated 40 min for the initial teaching session for BGM, made a long list of each of the elements for teaching blood glucose monitoring. The CDE then wrote: “Phew, when you write it down, you realise how much there really is, no wonder it can take up to an hour!!!” (CDE 7).

This comment recognises the large amount of information involved in teaching blood glucose monitoring that impacts on the cognitive load of the learner. The large amount of information to be presented for learning in a short timeframe overloads the working memory and limits the learner’s ability to process the information in a useful way.

As noted earlier, 9 CDEs responded to the question about time allocation and provided either specific information about group education or noted that their clients received a combination of BGM education across groups and 1:1 education sessions.

These participants noted that group education was best used for the theoretical or generic concepts involved in BGM education. One CDE described the group education content as:

> In the group sessions we discuss:
>
> The reasons for monitoring.
>
> The importance of having clean hands
>
> The importance of ensuring the monitor is correctly calibrated
>
> The importance of ensuring the strips are in date
>
> The importance of changing the lancet device
>
> Proper disposal of the lancet device
>
> Using control solutions
>
> Target BGL's
>
> The appropriate time to monitor and why
>
> Interpretation of levels
>
> Why people sometimes wake with a higher level than when they went to bed
>
> If a person is commenced on insulin we reinforce the importance of monitoring and achieving BGL's within the target range. (CDE 2)

These topics are relevant to all people learning to monitor blood glucose levels. As noted at the end of the quote, issues such as insulin administration or other hypoglycaemic medications would add some content to the list of topics to be covered in blood glucose monitoring.

However, other topics such as completion of warranty cards for the meter, membership of the National Diabetes Supply Schemes (NDSS) and purchase of a sharps disposal container (or alternatives) would also be covered at some time in a typical diabetes education session about blood glucose monitoring.

Table 7.3. Time allocation for group blood glucose monitoring education

Time allocation	Initial teaching (N = 22)	Comments
15 min	2	30 minutes 1:1 follow-up (CDE 7)
40 min	1	
60 min	3	Group sessions 90 mins of which BGM will take up 60 mins (CDE 1). Plus 30 minutes 1:1 follow-up (CDE 13)
2 hr	1	I had to allow much longer, about 2 hrs. It is better to keep the group small (around 6 people if you are alone) so you can give attention to those who need it. (CDE 9)
No time indicated	1	Extensive list of what is discussed provided. No teaching of technique (CDE 2)
	13	No information provided
	1	Not applicable (CDE 16)

Note. CDE = credentialed diabetes educator; BGM = blood glucose monitoring; 1:1 = one-to-one.

The main section of the email interviews sought the CDE understandings about teaching, learning, the CDE role and the role of the patient.

In the next section of this chapter, the results of the analysis of this data are presented.

CDE Understandings

The 22 CDE participants provided responses via email to six original questions and then to six follow-up questions in a subsequent email. The responses for each CDE to both questions were analysed using the same analysis procedures as used in Study 1 and Study 2.

Teacher Knowledge Classification

The following figures represent the findings of the teacher knowledge classification analysis for the 22 CDE participants in Study 3. It is important to note that within this classification of teacher knowledge, each statement provided by the CDE participant has been attributed to all relevant categories. This means that each statement could be attributed to more than one category of teacher knowledge.

Table 7.4. Study 3: Summary of all 22 CDEs teacher classification statements as percentages of total statements.

	Participant number																								
Classification criteria	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**Average**	**Minimum**	**Maximum**
1. Content knowledge	31	35	32	14	85	23	19	34	25	16	15	16	4	8	28	25	8	5	16	29	10	14	23	4	85
2. General pedagogical knowledge	32	30	41	39	39	47	36	42	37	41	46	53	35	51	46	46	53	45	43	38	43	45	42	30	53
3. Curriculum knowledge	4	0	0	0	0	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
4. Pedagogical content knowledge	2	0	0	0	0	0	8	3	6	0	0	0	0	0	0	0	0	0	2	6	2	0	1	0	8
5. Knowledge of learners and their characteristics	3	4	1	4	4	0	3	0	17	2	1	0	2	5	0	0	2	3	0	2	6	1	3	0	17
6. Knowledge of educational contexts	2	0	1	3	0	0	1	0	0	3	2	0	0	0	1	4	0	2	0	0	0	0	1	0	4
7. Knowledge of educational ends, purposes & values, and their philosophical and historical grounds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8. Knowledge of learning (Grossman, 1995)	26	31	23	39	27	30	30	20	14	38	36	31	58	37	26	36	37	46	39	25	40	40	33	14	58

In Figures 7.1 to 7.8 below the vertical axis represents the percentage of the total number of statements which were identified as demonstrating the type of knowledge in that category of teacher knowledge classification. On the horizontal axis are listed participant numbers 1 to 22.

Content Knowledge

The range of statements in the content knowledge category was 4% to 85% with an average of 23% and a median of 17.5%. The outlier of 85% was a case whose responses to the initial questions included little discussion about teaching and learning.

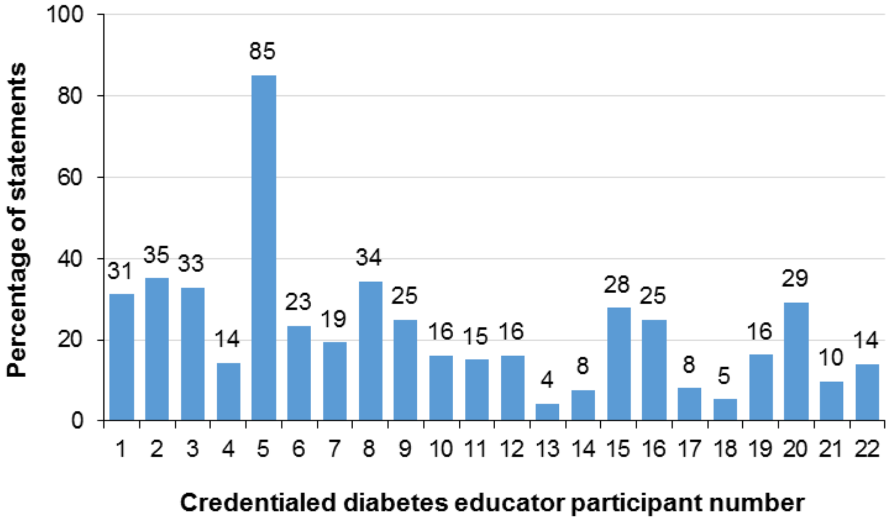


Figure 7.1. Percentage of statements in Category 1: Content knowledge of teacher knowledge classification for CDEs 1–22 in Study 3.

The following excerpts are examples of content knowledge included in statements by CDE 5. It is important to note that variations on these same ideas were repeated throughout the responses from CDE 5, thus indicating they were perceived as important to her.

> Help them understand that BGM is just one tool to aid them in overall diabetes management.

> Tell them the normal BGL parameters and what they are aiming for.
>
> Explain appropriate times to take BGLs and how to apply this to their diabetes management in regard to meals and Physical activity.
>
> Help to understand how to problem solve i.e. food diary, portion sizes, physical activity
>
> Not to worry if BGLs are out of desired range at this stage, we are just establishing what their glycaemic control is at this time; need to have a base line to work from. (CDE 5)

CDE 5 was identifying what would be the topics of discussion in her sessions and this was similar across all her responses. The coverage of content across the group was quite wide, including:

- the purpose of the session,
- the meaning of BG level,
- appropriate ranges for BG levels,
- factors affecting these levels,
- operation of the BG meter,
- interpreting readings, and
- appropriate action for high/low readings.

There were three patterns of performance in relation to content knowledge. CDE 5 displayed one pattern, with the majority of her responses to questions focussing on content of the sessions. This may have been the result of a misinterpretation of the questions. However, the pattern was displayed across both response occasions so there was consistency in her statements.

Another possible interpretation of this pattern of response was that CDE 5 focussed attention in the education sessions primarily on delivery of content, without a major concern for the process of delivery that would result in successful knowledge construction by the patient. If this was so then CDE 5 could be adopting a largely “transmission” approach to learning, where the emphasis is on getting the key points of content ‘out’ to the patient, with less concern being paid to how, and how well, the patient was understanding that content. This approach runs the risk of overloading the patient with information and this would act to inhibit detailed knowledge construction.

Low levels of responses classified in this category formed the second pattern of response, with four CDEs making less than 10% of statements in this knowledge category. This pattern of response is the reverse of the first pattern, and is less concerning than that first pattern, assuming of course that they included a focus on the important content and did not ignore some of the critical information. In this case, the four CDEs have responded to the questions mostly in reference to other categories of teacher knowledge, which could indicate a greater concern for the process of teaching and for the effect of that teaching on the level of patient understanding.

Table 7.5. Summary of 4 CDE teacher knowledge classifications as percentages of statements.

CDE	Content	GPK	Curriculum	PCK	Learners	Context	Purpose	Learning
13	4	35	0	0	2	0	0	58
14	8	51	0	0	5	0	0	37
17	8	53	0	0	2	0	0	37
18	5	45	0	0	3	2	0	46

Note: CDE = credentialed diabetes educator; GPK = general pedagogical knowledge; PCK = pedagogical content knowledge.

As shown in Table 7.5, all four of these participants' responses included substantial discussion of GPK and knowledge of learning. For each, about 90% of their statements fell into these two categories, indicating a major concern with the process of delivery and its effect on the patients.

The third pattern of response for content knowledge included the remaining 18 CDEs' whose profiles included between 10 and 35% of statements related to this category. This more moderate level of concern with content knowledge would also have allowed for a greater concern with the delivery process and effect on patient understanding.

General pedagogical knowledge

Figure 7.2 represents the number of statements made by each of the 22 CDEs which were attributed to the category of general pedagogical knowledge (GPK).

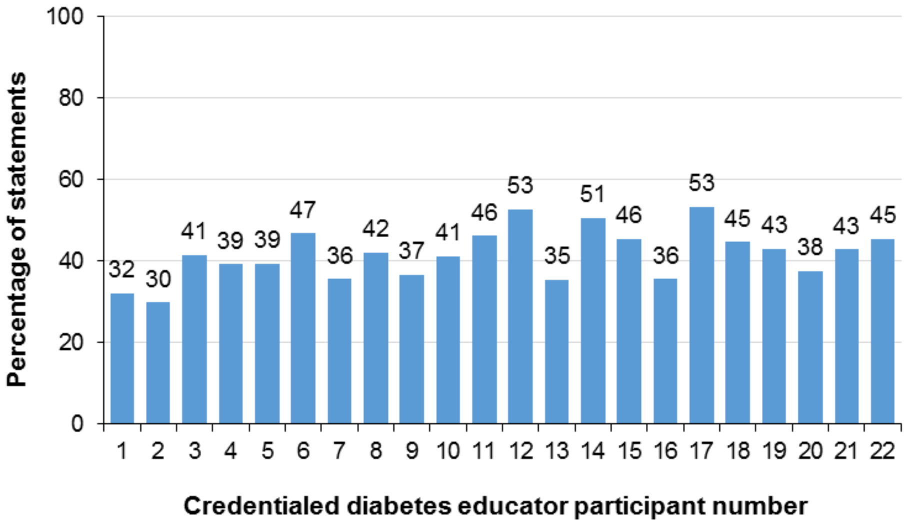


Figure 7.2. Percentage of statements in Category 2: General pedagogical knowledge of teacher knowledge classification for CDEs 1-22 in Study 3.

The average frequency of general pedagogical knowledge (GPK) of the 22 CDEs was 41.5% (median). The pattern in Figure 7.2 indicates a substantial level of responses related to general pedagogical knowledge across all participants, with around a third to a half of all statements for all participants relating to this category.

As noted before this pattern of findings for GPK could easily be (mis)interpreted as indicating that there is nothing to worry about with respect to CDE's knowledge about teaching. However, it will be relevant to consider this frequency of response alongside the level of quality of these statements, which happens in a later section. If the depth of this knowledge is limited this would also reduce the choices of strategies available to the CDE when teaching and so would limit the educational power of this body of GPK. The fact that the average frequency of statement related to GPK is relatively high here suggests that these CDEs do have "theories" of learning, even though these might be informal and not well-developed, and might or might not be well-founded.

Some examples of statements where GPK was evident are provided below.

> By answering their questions I will be meeting their needs. This will help them to learn. (CDE 6)

This example indicates a broad understanding of motivation and the various needs of the patient. This next example highlights a range of elements identified as examples of General pedagogical knowledge. Within this paragraph CDE 12 was noted as having six examples of GPK. Many of these are not specific examples of the expert knowledge of a CDE, rather the knowledge developed by adults in the responsible position of parenting or coaching. For example, it is reasonable to expect a parent to demonstrate or show their child how to do something new. Parents and coaches would also be likely to ask questions. Therefore these statements have been attributed to the CDE holding GPK but they are not necessarily indicative of expert or specialised knowledge.

> Initially, I do the talking and demonstrate what they need to do, but I encourage the person to ask questions along the way. I then get them to have a play with the equipment and have a go at a self test. I encourage them to talk back to me and tell me what they are doing as they are performing the test, as I believe the best way to learn is to teach someone else! (CDE 12)

The references made to ‘having a play’ and ‘talking back’ are likely to be examples of a more developed understanding about teaching. Thus the above examples indicate that CDE 12 has some GPK but it may be informal and might not be well founded or sufficiently complex.

CDE 21 acknowledged the importance of providing information at a level suitable for the learner (patient) and in a way that builds on from their existing knowledge. Importantly CDE 21 implies she would frame the content to meet the individual’s learning needs, though she does not elaborate on how this is done: “Teach the person the relevant information about BGM at an appropriate level and style suitable to the individual framing the information to their particular circumstances and existing knowledge”.

Another example of GPK was provided by CDE 16 when she identified a clear sequence of steps and processes for teaching blood glucose monitoring.

> Teaching Blood Glucose Monitoring involves 4 processes.
>
> 1. Seeing a demonstration and copying the steps.
> 2. Understanding the significance of why each step is required.
> 3. Problem solve the reason/s for the level obtained.
> 4. Understand BGM is a tool to assist with the management of their diabetes/long term health care. (CDE 16)

CDE 16 used demonstration and copying of the monitoring procedure as the first step. She then identified the importance of giving a reason for each step to the learner (patient) followed by a problem solving approach to understand the reading achieved. Finally, CDE 16 was keen for the learner to understand that the blood glucose monitoring was a tool for diabetes management and not a test of their compliance which recognises the respect and non-judgemental aspect of teaching and learning. These are all important elements of teachers' general pedagogical knowledge.

In summary, these four steps provided by CDE 16 provide a description of a procedure that should be useful for helping the learner with construction of knowledge. Although it does not involve the use of the technical language of theory related to knowledge construction, it would be useful because it *could* potentially result in:

1. effective analysis of presented information (*seeing and copying, each step*),
2. be goal-directed (*understanding significance*),
3. monitoring of understanding (*problem solve*), and
4. transfer of knowledge to daily life (*tool to assist with management of their diabetes/long term health care*).

However, we do not know if this procedure would be carried out effectively and it is important to note that there is no concern here with the motivational component of learning.

Curriculum knowledge

The following figure is a summary of the statements attributed to curriculum knowledge. As is evident there were very few examples of curriculum knowledge provided. It is important to note that the interview questions here were not designed to retrieve this information. However, three CDEs provided statements which contained examples of this category of knowledge.

Note: the percentage range on the vertical axis for Figures 7.3 to 7.6 has been adjusted to 0–20 % to enable the small numbers to be visible.

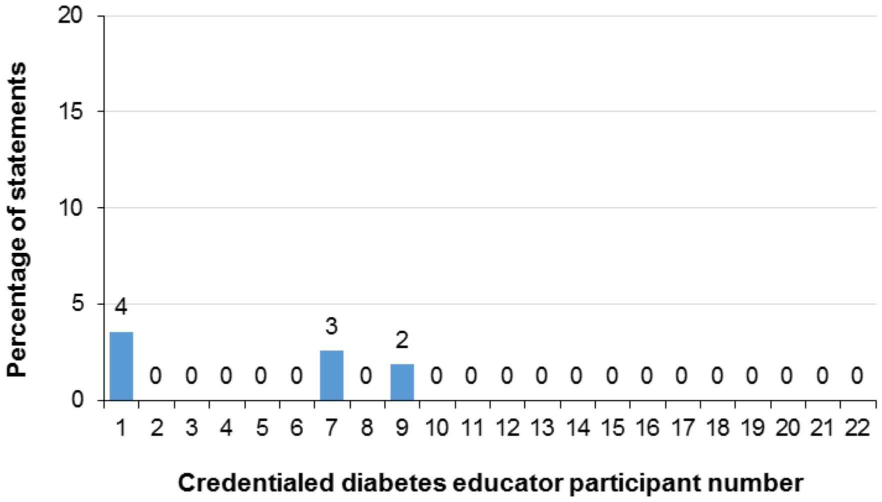


Figure 7.3. Percentage of statements in Category 3: Curriculum knowledge of teacher knowledge classification for CDEs 1–22 in Study 3.

The three examples of curriculum knowledge as provided in statements by the CDEs are presented below. In each of these examples the participants focus on the sequence of the curriculum content to be covered.

> I would show the client how to use the monitor starting with installing the lancet into the lancet device, showing them about setting the number to indicate the depth that the needle will go into their finger, then actually preparing the lancet device so that it will perform the prick, and also show them on their hands where they can prick their fingers once they have washed their hands. (CDE 1)
>
> Go through theory of BGM, i.e. why we do it. I leave this til later because the finger pricking is out of the way, & they are more relaxed & able to listen. (CDE 7)
>
> Explain why we do a bgl, when we do a bgl and then show them how to do a bgl. (CDE 9)

Pedagogical content knowledge

The pedagogical content knowledge provided by the 22 CDEs was remarkably low, ranging from 0–8% as shown in Figure 7.4.

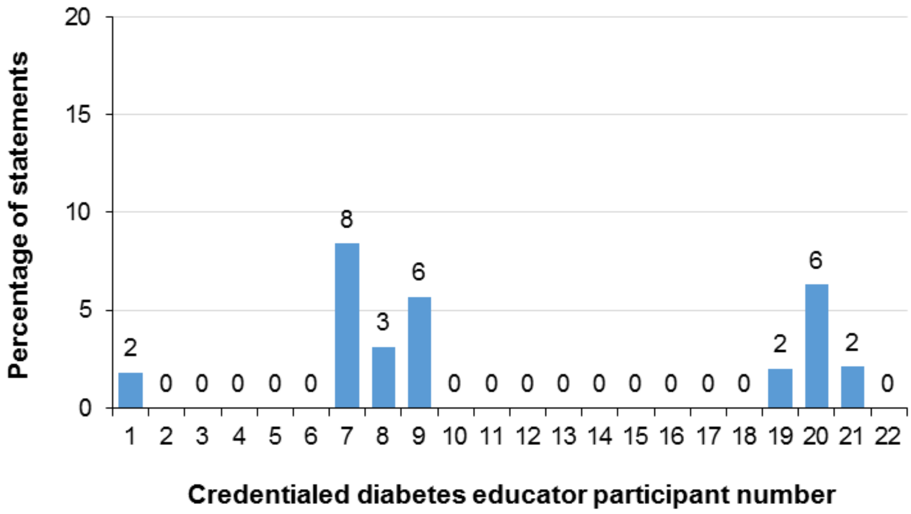


Figure 7.4. Percentage of statements in Category 4: Pedagogical content knowledge of teacher knowledge classification for CDEs 1–22 in Study 3.

Only seven participants provided examples of this category in their interview statements, with the frequency of statements in each case being at a low level. This was a surprise given email interview question number 5 which was:

> Question 5: What are the most important things you will do as a diabetes educator to help this person learn effectively in this session?

It was hoped that this question would elicit statements which identified knowledge specific to an expert CDE that would be relevant in instruction of how to use a meter. Statements related to pedagogical content knowledge included

> I then go through the calibration, pointing out where they find the calibration code on the bottle/packet of strips and on the chip or calibration strip. (CDE 1)
>
> I would advise to have everything out & ready before starting the test. (CDE 7)

The procedures identified in these statements can be very significant in the patient's learning because they can assist encoding and recall and help prevent the development of an incorrect technique and thus incorrect results. Much of this information is not typically stated in sets of instructions provided with blood glucose monitoring equipment.

> Little things like, "listening for a click" to ensure the lancet device is connected properly and thus lances correctly. Also, "close the lid to your strips immediately as they are damaged by exposure to the air"
>
> "check the use by date as they are inaccurate if out of date", "lance on the sides of your fingers where it hurts less",
>
> "don't over squeeze your finger as this can cause an inaccurate reading,….rather increase the setting on your lancet device and start again". (CDE 8)
>
> I always make it very clear how their bgl relates to food and how they can tell if they are having too big a serve of carbohydrate at a meal by their 2hr post prandial bgl. Most clients find carbohydrate portions difficult to grasp, so it is very helpful in that regard and it empowers them to self manage. (CDE 9)

If the patient is a determined problem solver then the absence of this expert knowledge may not affect their learning, as they will figure out these processes and strategies for themselves. However, the lack of such information could be a serious disadvantage for other patients, such as Patient A in Study 1 where the absence of this information was associated with failure of BGM testing in the period after that patient's first DE session..

Knowledge of learners and their characteristics

The figure below represents the frequency of responses coded for category 5 of Shulman's (1986a) teacher knowledge classifications. Again this figure has the vertical axis adjusted to more clearly present the findings.

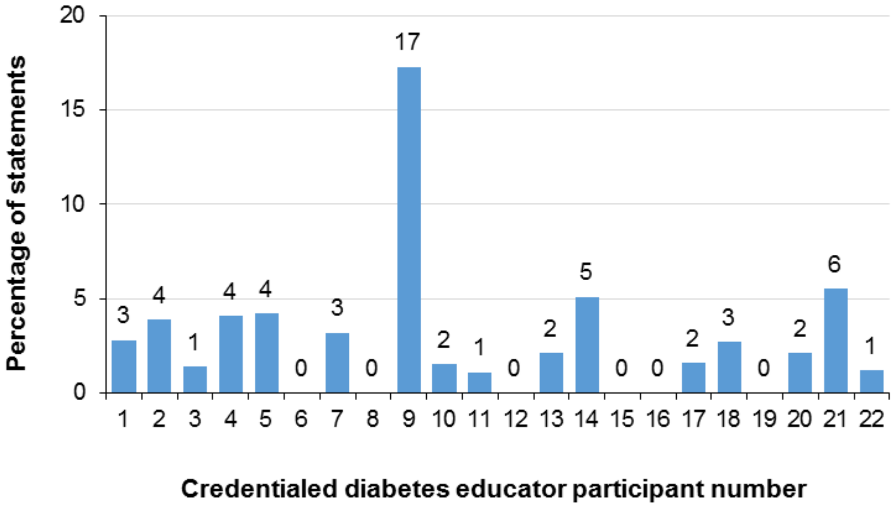


Figure 7.5. Percentage of statements in Category 5: Knowledge of learners and their characteristics of teacher knowledge classification for CDE 1–22 in Study 3.

The majority of CDEs (19) provided less than 5% of statements which could be attributed to this category, indicating limited considerations to this area of teacher knowledge. The largest sub-group of CDEs (6) provided no statements able to be attributed to this category which is of concern given the tenets of diabetes education to be individualised and patient centred.

Table 7.6. Summary of low knowledge of learners

Percentage of statements	Number of CDEs
0%	6
1%	3
2%	4
3%	3
4%	3
> 5%	3

Note. CDE = credentialed diabetes educator

As evident in figure 7.5, CDE 9 had the most examples (17%) of knowledge of learners and their characteristics in her interview statements.

The following excerpts are examples of the statements provided by CDE 9 which were identified as knowledge of learners and their characteristics.

> Recognise the learners educational needs, allaying their anxiety.
>
> Recognise the client's needs and concerns, allowing time where needed to deal with pressing issues and providing encouragement.

The statements above recognise the importance of anxiety and encouragement. CDE 9 acknowledged the need to individualise educational tools and approaches: "By this I mean that all clients are unique so you may need to make adjustments to a set educational tool to suit each one".

In addition to these examples, other CDEs recognised the individual needs of patients when teaching blood glucose monitoring, specifically the patients culturally diverse backgrounds:

> I often complete the forms if the person has low literacy or is from a CALD group. (CDE 21)
>
> providing a suitable and culturally appropriate environment … a culturally appropriate setting where the session is directed towards what they want/need to know. (CDE 18)

Other characteristics important in a geographically large country like Australia were identified by CDEs working in rural locations.

> I usually ask them about themselves, their social circumstances and assess their understanding about and perceptions of blood glucose monitoring, current knowledge and capability to undertake BG testing including financial issues given our rural setting and the current financial status. (CDE 21)

The CDEs also identified advanced age and English as a second language (ESL) as important characteristics of the learner which needed to be taken into account in their teaching.

> My role is: assess level of literacy/cognitive ability/other person support provide the patient a written handout in a language they can read. (CDE 14)

In addition to the cultural and language differences, CDE 3 also noted other physical issues which can affect their use of a blood glucose meter and the subsequent learning: “I may also suggest a particular meter for people with eyesight problems or arthritic fingers”.

The above examples show an understanding of the individual differences among people with diabetes. However, the examples are limited to a small number of the CDEs which suggests limited knowledge or ready access or attention to knowledge about learners and their characteristics. Given the widespread belief that education should be individualised for the person living with diabetes, knowledge about patients as learners and their characteristics is significant in this high stakes event.

Knowledge of educational contexts

The sixth category of teacher knowledge according to Shulman (1986a) was that of educational contexts. In this category, the CDEs provided very few examples in their interview statements as evident in Figure 7.6. Again, the vertical axis has been altered to improve the clarity of the figure.

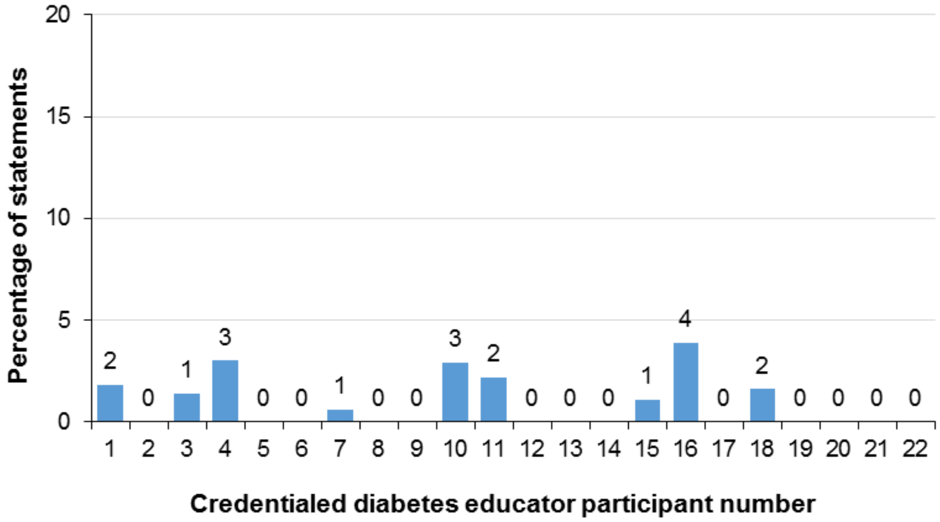


Figure 7.6. Percentage of statements in Category 6: Knowledge of Educational Contexts of Teacher Knowledge classification for CDE 1–22 in Study 3.

It is not surprising that there were limited statements about educational contexts from the email interviews as this was not a direct question. However, given the variety of places in which learning occurred and different modes of teaching provided in diabetes education the very small number of examples was unexpected. The following is an example of a statement about an educational context related to the mode of delivery and the location of the learning.

> Some meters provide a DVD so this can be provided to the client to use at home. (CDE 16)

CDE 16 also identified that patients learn from family and friends at home as well as the ward staff in hospitals.

> From family and friends who blood glucose monitor. From observation of ward nursing staff in a hospital. (CDE 16)

Another example of knowledge of the influence of an educational context is evident in the statements below from CDE 10. In this first example CDE 10 focuses on the management of the learning environment as important to the teaching and learning.

> This may involve making sure there are no interruptions in a calm and comfortable environment. (CDE 10)

CDE 10 identified that teaching and learning occurs both within the education session and beyond it through reading handouts and discussing with their family at home.

> An adult only takes in approx 25% of what they hear during a health interview, by having this info written at home to go over in the comfort of their home it will help reinforce what I have said. Hopefully this info will also be shared with other important persons and it may generate conversation. (CDE 10)

Other examples of educational contexts included use of the internet, other educational sessions and reading.

> Basic knowledge may have been acquired through attending education sessions/programs, reading, internet, previous experience etc. (CDE 4)

Knowledge of educational ends, purposes and values, and their philosophical and historical grounds

There were no examples of the seventh category of Shulman's (1986a) teacher knowledge classification provided in the email interviews. This is not surprising as the interview questions were not designed to elicit this information.

Knolwedge of learning

The eighth and final category of teacher knowledge is the additional category identified by Grossman in 1995 and added to the Shulman (1986a) classification by educational researchers. This category is "knowledge of learning" that recognises the CDE's knowledge of processes or procedures used by the learner to facilitate learning and memory. The frequency range for this category of teacher knowledge across the 22 CDEs was 14–58% of statements attributed across the eight categories and the average was 33%.

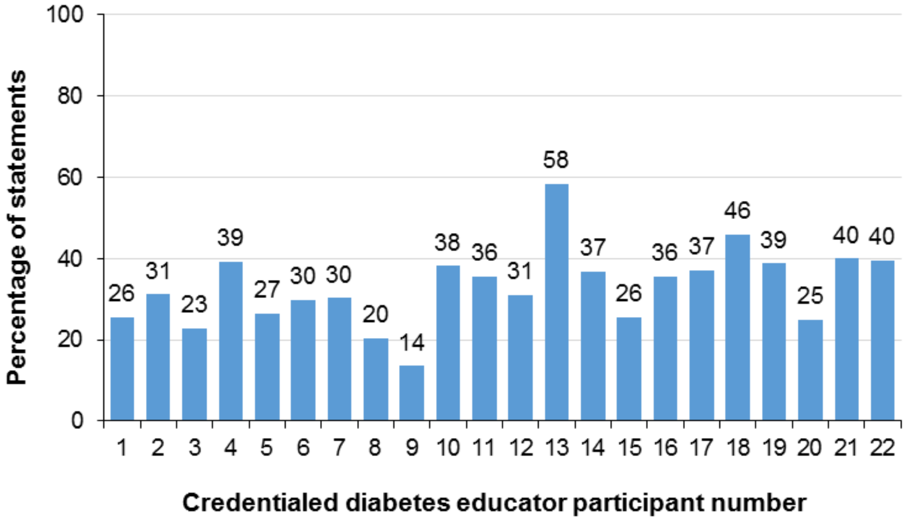


Figure 7.7. Percentage of statements in Category 8: Knowledge of learning of teacher knowledge classification for CDE 1–22 in Study 3.

In this final category of teacher knowledge classification, the majority of CDEs were attributed between 20 and 40% of their statements as examples of their knowledge of learning. Two exceptions were CDE 9 with 14% and CDE 13 with 58% of their statements in this category. The average was 33% of all statements being attributed to this category of teacher knowledge which on the surface is positive for patient learning.

There were a wide range of examples of the CDEs' knowledge of learning including

- establishing rapport,
- paying attention,
- listening,
- discussing,
- asking questions,
- watching,
- taking notes,
- practice and repetition, and
- taking responsibility for learning.

Examples of statements demonstrating the CDEs' knowledge of learning are provided below.

> To listen, discuss, ask questions so they really understand, and to show me that they have the correct technique for the meter. By listening, I hope that they would pay attention to what I say and do in the session, and if they wish, they can take notes, and ask questions. As we all have different learning styles, I would try to ascertain their learning style, whether it be auditory, visual or kinaesthetic, and teach accordingly. (CDE 13)

The above example also demonstrates the CDE understanding of different ways people learn. The example below identifies the role of rapport between the CDE and patient so the patient feels comfortable to talk about diabetes management which is recommended but that they do not want to undertake.

> I was referring to establishing a rapport with the client so that they will come back and also so they feel comfortable with asking questions, opening up to you and also being honest with you so that they tell you if a suggested course of action will not work for them and why. (CDE 18)

Many CDEs identified the need for the patient to ask questions and the associated teaching action of explaining and re-explaining as necessary: “re-explaining as many times as need be until they understand” (CDE 13).

CDE 13 also identified the need to let the patient play with equipment as a source for learning: “Let them play with the meter until they feel comfortable with it”.

In addition to this, the notion of repetition was strong: “get them to do it over and over again before they get the hang of it” (CDE 13). An interesting perspective on this was that repetition would lead to “getting it right”: “so repeat, repeat, repeat, and they will get it right” (CDE 13).

Many CDEs identified the importance of repetition for learning but it should be noted that the expectation that repetition on its own would necessarily lead to ‘getting it right’ is not sound.

This next excerpt from CDE 22 showed her understanding of the role of problem solving in developing self management skills.

> Gaining knowledge in this circumstance is helping them to understand not only how to test but why they are being asked to monitor the BGLs, and what they need to do as the person with diabetes with the results of these tests. How I do this 2 ways once the session is coming to an end give them an example and see if they are able to problem solve. The same goes with the monitor as well. (CDE 22)

The development of self management skills through practice and opportunities to make mistakes and ask questions were features of the responses from CDE 4: “Client practices procedure from beginning following my demonstration step by step if necessary then repeating on own. Is allowed to make mistakes then shown correct way and practices until competent. Allow time for questions”.

In addition to self management skills, CDE 9 recognised the need for the learner or patient to take responsibility for their learning: “Be prepared to take responsibility for their condition, ask question if they don’t understand, try not to get distracted be ready to learn and cooperate with the teacher”.

The examples above show a wide range of Grossman's (1995) category of knowledge of learning amongst the CDEs, with similar responses from those scoring above the average of 33% in this category. This level of CDE knowledge of learning is positive and provides a useful foundation on which to build a strong framework for understanding learning. The issue of whether such strong frameworks were evident is the concern about the quality of the knowledge which is discussed later in this chapter. The limited quality of the CDE knowledge about learning and the absence of a theoretical foundation about learning suggest the CDE knowledge is limited or not well developed. This can impact on their use of this knowledge when teaching a person about diabetes self-management.

Learning Activity (COATSRUAM)

The interview transcripts of the 22 CDE participants in Study 3 were also analysed using the COATSRAUM framework (Lawson, 2000). This framework was used to identify statements made by the CDE that reflected their understanding of the different categories of learner activity. Whilst related to the CDEs knowledge of learning, in this section there is a more detailed analysis of the CDE statements about the processes involved in learning and the activities the patient needs to undertake for learning. Thus, this represents a different, somewhat deeper analysis of the state and quality of their knowledge of learning.

Table 7.7. COATSRUAM terms

Category	**Description used in analysis**
Context	Factors affecting learning such as: Culture, physical environment, teacher, partner/significant other.
Orientation	Learner view of self as a learner derived from the past experience with these tasks, out of which they have developed specific views of themselves in relation to these tasks, e.g., dislike technology. Learner attributes and characteristics including motivation, confidence and student anxiety.
Analysis	Analysis of activity to establish a representation, or understanding, of the task. Pulling information apart. Learning a skill has parts or steps that make up the whole. Includes interactivity (such as using a piece of equipment) and explaining.
Transformation	The quality of this transforming activity during the encoding process is a major influence of how successful attempts at retrieval will be at a later time. This is changing of the information, reducing, repeating it, adding to it, elaborating it, linking to existing knowledge and developing it.
Storage	Ways to remember. Organising for storage. Helping the student to remember. Includes propositional networks.
Retrieval	The ability to access stored knowledge. Recall. Using cues or hints to recall.
Utilisation	Transfer of learning is the ultimate aim of our learning and teaching. Practice increases automaticity and thus access to information. Ability to utilise the information in novel ways and situations.
Attention	A limited but allocatable resource that can be directed by the learner towards the demand of the task, or divided between tasks.
Management	Effective learning and problem solving is under the control of the learner. It is managed, or self-regulated. Metacognition. Checking, evaluating, revising and reflecting. Empowerment.

Table 7.8 is a quantitative representation of the percentage of statements made by each of the 22 CDEs in Study 3 which were attributed to each of the categories of the COATSRUAM framework.

Table 7.8. Percentage of statements attributed to each category of the COATSRUAM framework for learner activity

Participant number →	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	
Category ↓																							**Mean**
Context	17.3	14	12.5	16	16.4	12.8	8.5	11.8	8.3	12.8	9.8	14.9	12.7	12.7	5.5	7.7	11.4	12.5	10.5	9.1	11.2	15.4	11.9
Orientation	30.8	24	23.2	24	18.2	23.1	23.4	21.6	22.2	25.5	15.7	19.2	12.7	20	22.2	17.3	17.1	16.7	21.1	25	23.9	23.1	21.4
Analysis	23.1	28	21.4	18	12.7	20.5	27.7	23.5	25	21.3	21.6	27.7	22.2	12.7	33.3	26.9	25.7	25	26.3	25	18.3	20.5	23
Transformation	0	2	3.6	4	5.5	5.1	4.3	5.9	11.1	4.2	7.8	8.5	4.8	3.6	0	5.8	5.7	4.2	5.3	6.8	8.5	7.7	5.2
Storage	1.9	6	3.6	2	5.5	7.7	0	0	0	2.1	2	4.2	3.2	5.5	0	5.8	2.9	2.1	5.3	4.5	4.2	2.6	3.2
Retrieval	1.9	4	3.6	6	7.2	7.7	2.1	3.9	0	0	5.9	4.2	6.3	7.2	1.9	3.8	0	6.2	3.5	0	2.8	0	3.6
Utilisation	7.7	6	8.9	6	9.1	5.1	10.6	3.9	2.8	6.4	7.8	6.4	12.7	5.5	3.7	11.5	11.4	12.5	7	9.1	9.9	7.7	7.8
Attention	11.5	12	14.3	14	14.5	10.3	12.8	13.7	11.1	14.9	15.7	12.8	12.7	16.4	16.7	7.7	14.4	10.4	10.5	11.4	12.7	12.8	12.9
Management	5.8	4	8.9	10	10.9	7.7	10.6	15.7	19.5	12.8	13.7	2.1	12.7	16.4	16.7	13.5	11.4	10.4	10.5	9.1	8.5	10.2	11

In Table 7.8, there are three main groups of results. The categories of orientation and analysis (median > 21%) were *high frequency categories for almost all respondents*. This is likely as the CDEs were notably worried about the affective state of people and recognised the difficulties of teaching and learning when people are worried about something. However, the CDE still needs to teach and anxiety can create a heightened level of awareness which can create a focus for the learning.

The *middle frequency range* of responses (median 7–13%) was attributed to the categories of context, utilisation, attention, and management. If all categories were equally represented by the CDE statements, and there is no theoretical basis for this to be the case, then there would be around 11% of statements attributed to each category.

The categories *least* represented or low frequency statements (median < 6%) made by the CDEs are those in the categories of transformation, storage, and retrieval. This suggests the CDEs may not have high levels of readily available functional knowledge about these aspects of learner activity.

The CDEs did not easily provide statements attributable to some of the COATSRUAM categories in the second email sent to prompt or cue them. There were nine participants whose profile had a zero % in at least one category. CDE 9 and CDE 15 each had two categories with zero scores. This suggests that detailed knowledge of some key learning processes may not be functionally available for some of the CDEs. Functionally available knowledge would be easily activated and thus expected to appear in responses in this study. The fact that it did not appear suggests the in certain categories CDE knowledge might not be readily activated and used during a typical DE session.

It is possible that the format of the questions did not encourage the CDEs to provide this level of detail about the activity of the learner. However, the questions below did seek to gain information about the CDEs understanding of *how* what they did would help the patient to learn.

Question 3: Tell me about what you will do to teach the person about BGM?

Question 3a: How will doing that teach them? (follow-up question)

Question 4: Tell me about what the person will do to learn about BGM.

Question 4a: How will doing that help them to learn? (follow-up question)

Many CDEs provided responses which were general or focussed on the practical components of blood glucose monitoring. In general, a small number of CDEs provided statements specific to learner activities and how the activities assisted the learner to construct their knowledge network.

Context

In Figure 7.8 the range of statements identified as related to the context of learner activity was 5.5–17.3% (mean 11.9%). Statements which reflected factors affecting learning such as: culture, physical environment, teacher, partner/significant other and the nature of tasks to be undertaken were considered to indicate an understanding of the role of context in learning.

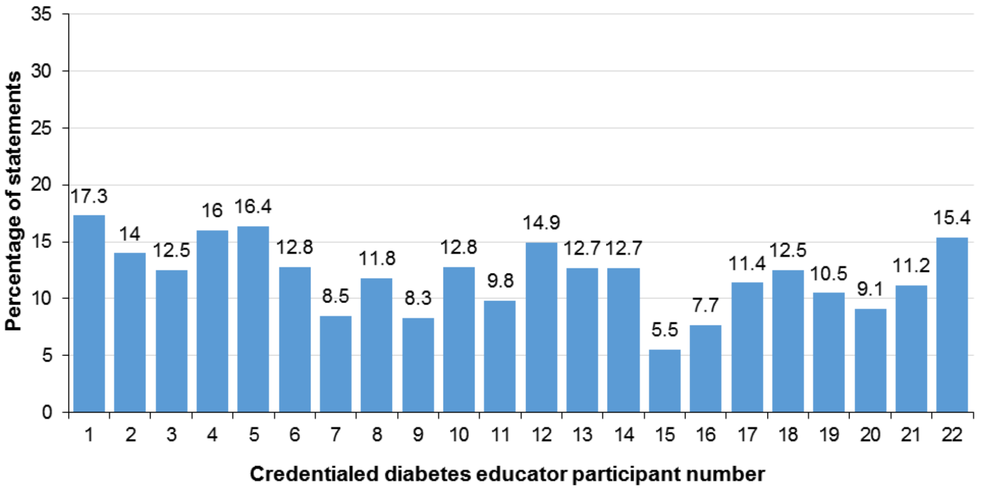


Figure 7.8. Percentage of statements about the context learner activity category in the **C**OATSRUAM framework for CDE 1–22 in Study 3.

The context can also include the idea of where some or all of the education about the use of the meter takes place. As mentioned by CDE 1, many CDEs do not sell blood glucose meters to people with diabetes and as such they may receive information or some education at the point of sale of the meter.

> I don't sell meters so the client is sent to the pharmacy of their choice to purchase the meter of their choice. The local pharmacy staff provide education at the point of sale regarding the use of the meter. (CDE 1)

The CDEs who noted the 'context' or place of purchase as important for the learner also indicated a need to check the understanding and technique was correct as part of their education process.

> I normally deal with the "theory" of blood glucose monitoring and the local Diabetes Australia sub-agent (a chemist) sells and demonstrates how to use the monitor. I would spend approx 15 mins watching client show me how they take their BGL and reinforcing correct technique. (CDE 5)

CDE 4 noted the significance of the physical and psychological environment for learning: "Create a comfortable, non-threatening environment".

The role of a 'comfortable' environment was mentioned by many CDEs as important for learning. CDE 21 identified the importance of an environment without any physical barriers: "Set the room up so there are no physical barriers".

CDE 10 also identified a comfortable, relaxed and welcoming environment as important for learning.

> Make client <u>comfortable, welcome them</u>. Remove any barriers to education first if appropriate e.g. can't learn if in pain, cultural problems etc. Role play, visual education, hands on education, in <u>a relaxed environment</u>. (CDE 10)

Others, such as CDE 17, identified family as important component of the context for the education sessions: "I encourage family to attend the session also".

Family members or significant others often attend education sessions because they play a role in the health care and daily living requirements of the person. Activities such as shopping, blood glucose testing or nutrition may be undertaken by others and the impact on the diabetes management and BGLs needs to be considered in the education sessions. CDEs who raised these issues as affecting the context of the learning by changing the physical or psychological enviroment had their statements attributed as context.

An example is when CDE 5 noted the affect of the client's age, mental and physical abilities, and language on the time required for the education session: "Obviously this time is variable depending on clients capabilities i.e age, mental and physical ability and language barriers".

Other CDEs reflected the role of a significant other in relation to the characteristics of the learner and its affect on their learning. In these cases the statements were attributed to the orientation of the learner.

Orientation

The second category in the C**O**ATSRUAM framework is Orientation and includes the affective and motivational characteristics of the learner. Key words or phrases included in this category are the learner's view of themselves as a learner (self-efficiacy), their motivation, confidence, anxiety and prior experiences as a learner or experience with a similar task (i.e., using new technology).

Figure 38 shows the range of statements across the 22 CDEs for the percentage of statements attributed to orientation of the learner. The range was from 12.7 – 30.8% of all statements made with an average of 21.4% which is in the highest group. Based on the content of the CDE statements, there was a greater focus on the affective/motivational/emotional state of the learner than there was on several key cognitive and meta-cognitive processes.

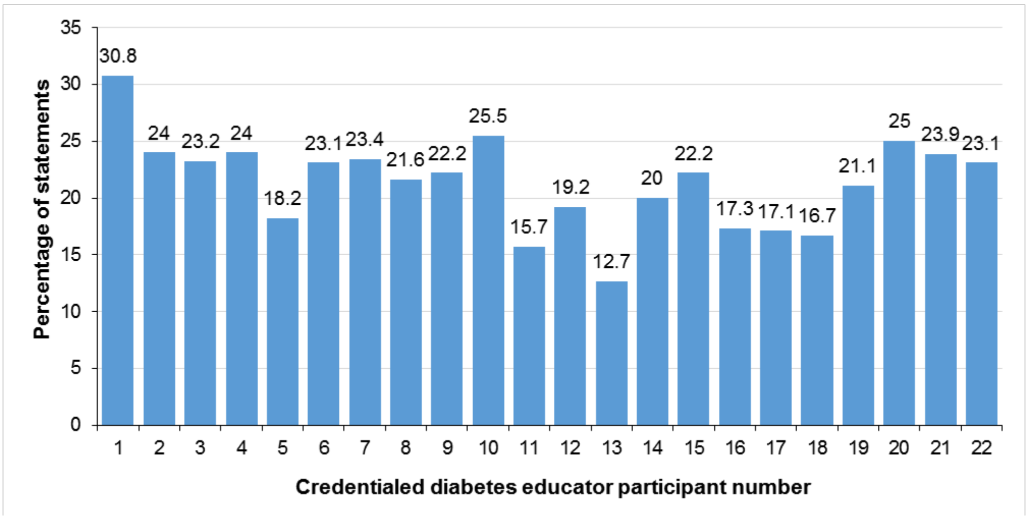


Figure 7.9: Percentage of statements about the orientation learner activity category in the C**O**ATSRUAM framework for CDE 1–22 in Study 3.

CDE 1 was focussed on the learner and their individual needs: "show them a variety of meters on the market that will suit their needs".

CDE 1 also encouraged the learner to take responsibility for their learning and showed confidence in their ability to individualise their diabetes management.

> I try to place an onus on the fact that they can blood glucose monitor to assist their own personal management of their diabetes. Clients are encouraged to test a variety of different times to suit themselves and are encouraged to document what their feelings are at that time. (CDE 1)

CDE 21 was focussed on the learner characteristics such as language in the first statement about time requirements for education: "Whether they speak English, family support/being educated at the same time, and such factors".

CDE 21 also noted the affect of age, gender, physical and cognitive abilities on learning: "That depends on their physical and cognitive capabilities, learning style, which is influenced by many factors including age and gender".

CDE 10 identified individual learner characteristics such as pain and cultural problems as significant barriers to learning. She also countered this with encouragement and praise which she understood to be important for learning:

“Remove any barriers to education first if appropriate e.g. can’t learn if in pain, cultural problems etc. … I use lots of encouragement and praise”.

CDE 10 and CDE 18 identified culture as a learner characteristic which was important and could impact on learning: “providing a suitable and culturally appropriate environment” (CDE 18).

Statements about the culture of the learner were attributed to the orientation category and in some cases also the Context category as, when noted by CDE 18, was significant in both understandings of learner activity.

Analysis

It is evident from Figure 7.10 and Table 7.8 previously that many of the CDEs in Study 3 provided statements that identified an understanding about the role of *analysis* in learning. This category had the highest percentage for almost all of the participants. It is highly likely that this is due to the content of blood glucose monitoring which lends itself to a step by step process which is a feature of this category.

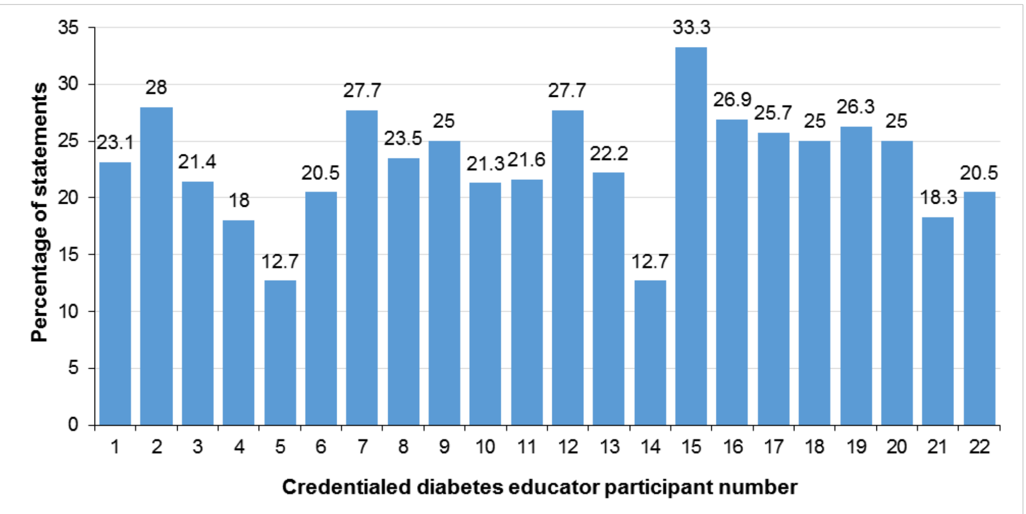


Figure 7.10. Percentage of statements about the analysis learner activity category in the CO**A**TSRUAM framework for CDE 1–22 in Study 3.

The range of the percentage of statements attributed to Analysis was 12.7-33.3% with an average of 23%.

In the email interview, CDE 2 provides a long list of the steps involved in all aspects of blood glucose monitoring which finishes with this following statement.

> I then take then though the steps of inserting the strip into the monitor, pricking their finger and placing the blood sample on the strip. Once I have gone through these steps I ask them to do the procedure from start to finish. (CDE 2)

In addition to the step-by-step approach of CDE 19, the importance of explaining each step was highlighted as learner activities that can help make clear what parts of the information being presented need to be identified: “The verbal communication would be reinforcing the demonstration and explaining each step of BGM”.

CDE 15 provided similar example as above in his email interview and then in a somewhat different approach provides great detail about the relationship between the internal body functions and blood glucose management and the need for the learner to understand this detail as a significant learner activity: “I always begin by explaining glucose transport in the body including how the blood glucose level should be a certain level 2 hours post-prandial”. This example by CDE 15 is an example of ‘pulling information apart’ to assist the learner to understand how blood glucose levels fluctuate.

Transformation

In the COA**T**RSUAM framework ‘transformation’ refers to activity that changes the information during the encoding process. During encoding the learner establishes a knowledge representation. This knowledge representation influences what knowledge and information can be retrieved when required at a later time. Examples of different transforming strategies include changing the information through repeating, reducing, elaborating and linking it to existing knowledge.

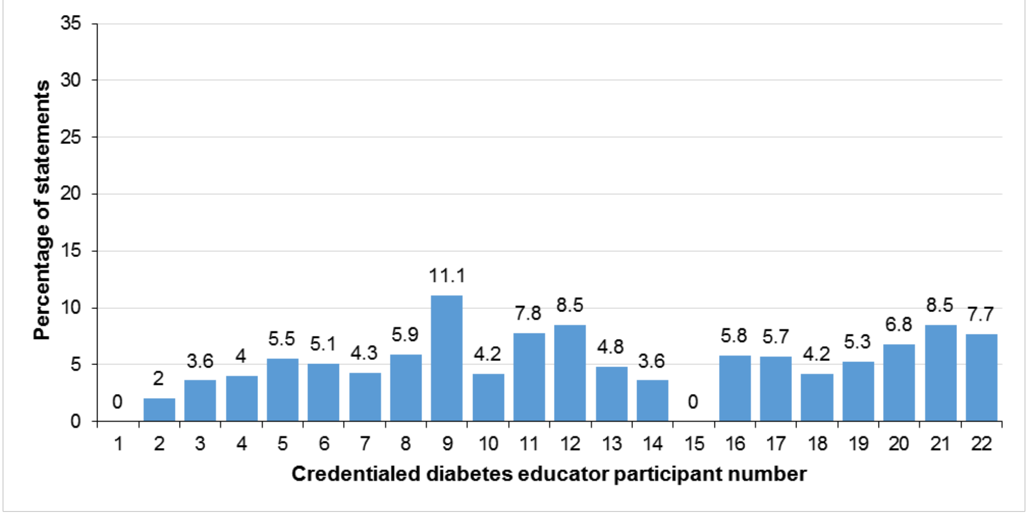


Figure 7.11: Percentage of statements about the transformation learner activity category in the COA**T**SRUAM framework for CDE 1–22 in Study 3.

The example below from CDE 9 shows how she assisted the learner (patient) to link the BGL results in their diary to their knowledge about food and how food affects blood glucose levels.

> Most of my clients have Type 2 Diabetes, so initially I ask them to do their bgls first thing in the morning and then 2hrs after meals. I give them a diary that has these times clearly set out and ask them to record their readings. (CDE 9).

This next example by CDE 21 identifies how reinforcement and providing information in different ways is used to transform knowledge during encoding.

> Reinforcement is important so I usually say the same thing in several different ways and ask them to summarise and often to list what they will do (CDE 21).

This response was also identified as an example of an activity which assists learner ‘retrieval’ as CDE 21 checks that it is retrievable by asking the patient to summarise and describe what they will do.

The relatively low level of transformation activity identified by almost half of this group of CDE participants is of concern. For 12 of the CDEs transformation formed less than 5% of the codes identified in their responses, and there was no evidence of concern with transformation for two in this group. This is of concern because what a learner does with new information in terms of transformation impacts on all subsequent knowledge construction. How the knowledge is transformed, or encoded, affects how it can be organised for storage, which in turn affects what can be retrieved and used in later problem solving. Thus, it is critical that transformation activity be given explicit attention to ensure the representation of knowledge about BGM is as good as it can be.

If CDE knowledge about learner transformation processes is low, then it is likely that the scaffolding of learning provided by the CDE will not be structured to support learners to transform selected information for effective knowledge construction.

Storage

The fifth learner activity in the COAT**S**RUAM framework is ‘storage’. How learners store information influences the availability and accessibility for retrieval. Teachers can include strategies to enable learners to actively store information in meaningful ways with strong links and networks that will facilitate subsequent retrieval and problem solving. The links within the knowledge or propositional networks assist later access and recall when BGL is being undertaken, or if a problem with BGL arose.

In the statements provided via the email interviews, examples of teaching strategies which promoted storage of information by the learner were at a lower level of frequency. Four participants did not mention storage in their responses and only six had more than 5% of their statements related to this key part of learning.

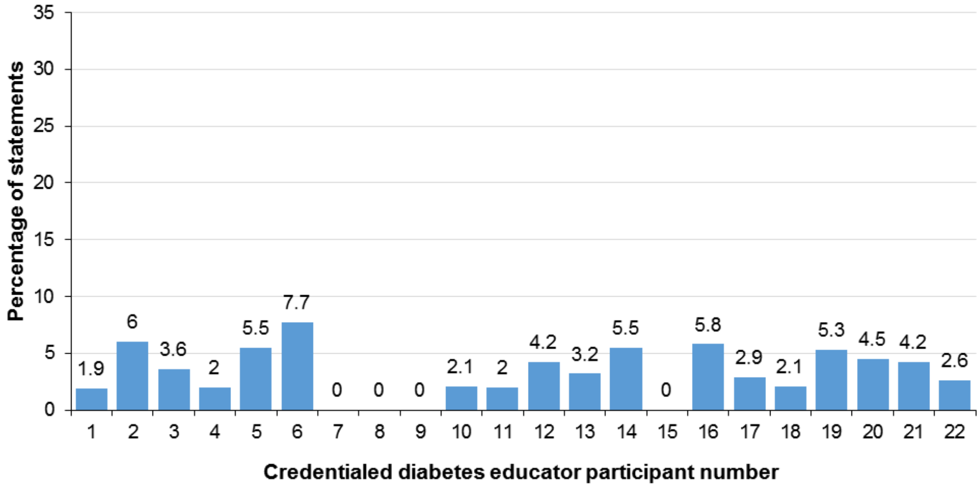


Figure 7.12. Percentage of statements about the storage learner activity category in the COATS**S**RUAM framework for CDE 1–22 in Study 3.

Some examples concerned with storage included the links and connections between blood glucose levels, the size of food portions and exercise as evident below in the statement by CDE 5.

> Help them understand how BGM can be useful as a tool in overall diabetes management. How it can “personalise” their own diabetes management …..Help to understand how to problem solve i.e. food diary, portion sizes, physical activity. (CDE 5)

The quality of this type of statement will be discussed later, as comments such as “personalise” and “help to understand” does not provide sufficient detail to know whether CDE 5 understands the benefits for storage and retrieval of information by using these relationships in her teaching.

Connections between key ideas enable multiple access points for the learner when trying to recall information. The more frequently these pathways are used the stronger the links and the better the access and recall of information by the learner as needed.

> I encourage them to talk back to me and tell me what they are doing as they are performing the test, as I believe the best way to learn is to teach someone else! I also encourage the person to show their family how to do it (for the same reason). (CDE 12)

The next statement by CDE 13 identifies the many aspects of blood glucose and the importance of grouping related information in the education session to enable storage and subsequent retrieval of the information when trying to use the blood glucose meter effectively at home.

> By explaining the workings of the meter, from showing them how to set the time and date to testing their BGL, and re-explaining as many times as need be until they understand, this should help them grasp the concept of BGL testing. (CDE 13)

In this next statement, CDE 21 more explicitly identifies the importance of storing new information with existing knowledge to enable expansion and development of knowledge networks.

> People learn best by doing. So they are more likely to learn how to test, retain the information and actually test if they are involved in practising and discussing how the activity BG testing fits into their existing knowledge, skills and attitudes. (CDE 21)

This idea of storing and linking new and old information is important for retrieval of information. Again, there is little evidence if CDE 21 understands the benefits of the teaching strategy for storage at a more abstracted level, but it does show a more explicit recognition, albeit not very detailed, of the importance of transformation for storage. The quality of the storage is significant as it leads to improved retrieval of information.

Retrieval

During the education session the CDE could provide opportunities for the learner to retrieve knowledge. These activities would strengthen the links within the knowledge networks and provide cues or hints for recall about the linked knowledge. As was the case with the Transformation and Storage categories, participants did not articulate knowledge about retrieval processes very frequently. Five participants did not discuss retrieval at all and for a further 10 the frequency of statements about retrieval was less than 5%.

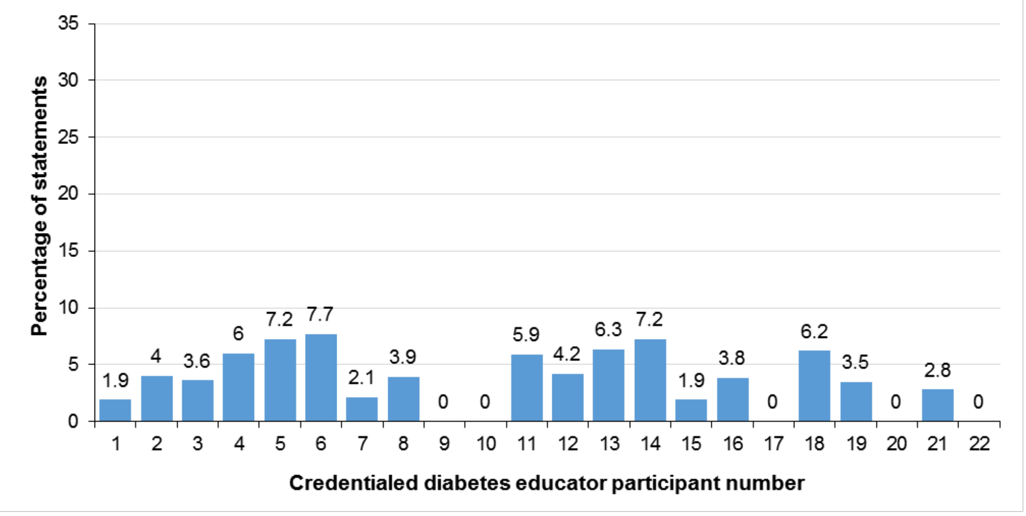


Figure 7.13: Percentage of statements about the retrieval learner activity category in the COATS**R**UAM framework for CDE 1–22 in Study 3.

In the statement below, CDE 5 links the knowledge about blood glucose monitoring with its use in the learners management plan. Specifically, she links it to the persons eating and physical activity to enable them to retrieve the information when at home managing their diabetes.

> Tell them normal BGL parameters and what they are aiming for. Explain appropriate times to take BGLs and <u>how to apply this to their diabetes management</u> in regard to meals and physical activity (CDE 5).

In this example the CDE endeavoured to link information to key times during the day when the learner might be prompted to retrieve to take a BGL, which would assist the learner to self manage their diabetes. However, the CDE's understanding about information transformation and knowledge construction, storage and retrieval is not discussed in a way that it might be in a developed theory of learning.

Other common examples of retrieval included opportunities for the learner to practise the technique after a demonstration.

> By watching me do a BGL test, then doing one themselves, and <u>repeating it if necessary</u>, until they believe that they are competent. (CDE 13)

> to ask questions , to demonstrate they have understood by using meter and lancet devise, feedback from GP/Patient whether their readings are used to adjust their diabetes management. (CDE 14)
>
> Allow time for more questions and then ask the person to list what they will do and how they will do the test. (CDE21)

These activities would strengthen the links within the knowledge networks and provide cues or hints for recall (retrieval) about the linked knowledge.

CDE 18 provided the example of discussing errors or potential problems when the learner is practising how to blood glucose monitor. This enables the learner to retrieve the relevant information if they encounter a problem when undertaking blood glucose monitoring.

> Have the person then take their BGL using their glucometer and lancet. Discuss potential errors/problems with SBGM and identify what to do to prevent errors/problems and what to do if they occur. (CDE 18)

The relationship between learner activities and teacher strategies enabling effective retrieval of information as needed by the learner is significant. The learner needs to be able to retrieve information in the absence of the expert health professional to understand their blood glucose levels or solve problems as they arise.

Whilst there is some evidence of these learner activities and the CDEs understanding of them, in most cases they were discussed implicitly rather than explicitly.

There were very few examples of statements for the three categories – transformation, storage and retrieval. This limited number of statements or evidence suggests the CDEs are limited in their understanding of how to assist the learner to encode the new information in a useful way that makes it easily retrieved when needed. This is a potential area for further research and continuing education.

Utilisation

Ultimately the purpose of learning is for the learner to utilise the new knowledge. In this research the focus of the education session was to teach blood glucose monitoring to a newly diagnosed adult with type 2 diabetes. The expected learning outcome would be for the person with diabetes to be able to monitor their diabetes and interpret the results correctly at home. To do this they would need to utilise their knowledge about the procedure for obtaining blood from their finger, test the blood using a monitoring device, understand the significance and implications of the blood glucose level shown on the monitor and dispose of the equipment safely.

In Figure 7.14, the percentage of statements attributed to utilisation is relatively frequent with only 3 CDEs showing limited responses in this category.

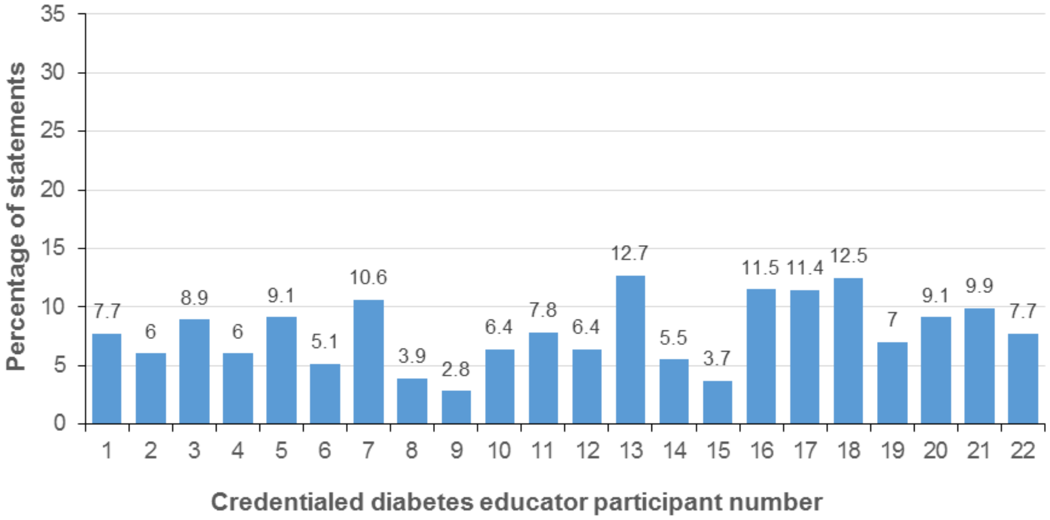


Figure 7.14: Percentage of statements about the utilisation learner activity category in the COATSR**U**AM framework for CDE 1–22 in Study 3.

In the teaching and learning event of a diabetes education session the opportunity to demonstrate the procedure of blood glucose monitoring to the CDE and then practise would be an example of a learner activity in the utilisation category. CDE 13 identified practice as an important learner activity: “Watch, listen and learn and practice. Repeat as many times as necessary”.

She went on to use a couple of ‘axioms’ about the benefits of repetition and practice in learning.

> Proper preparation prevents poor performance, so repeat, repeat, repeat, and they will get it right, and I know from experience that sometimes, I have to show the person and get them to do it over and over again before they get the hang of it, so “practice makes perfect”. (CDE 13)

An important point to note about ‘practice makes perfect’ is the need for the practice to be correct each time, otherwise an incorrect technique will be reinforced.

In diabetes self management it is essential for the person with diabetes to understand the blood glucose result and utilise their knowledge to act on the result. As CDE 16 suggests it is important to “problem solve the results that appear”.

As indicated by CDE 16 the person with diabetes needs to problem solve or work out what factors influenced their blood glucose result. This ultimately informs their management about diet, exercise and medication.

CDE 18 is clear about the relationship between what is discussed in the diabetes education session and how she expects the learner to utilise this knowledge at home.

> Discussion would include identifying what the client already knows, talking to the client about SBGM (benefits, how to SBGM, some problems that can occur and what to do about them), …. This would give them more information and increase their knowledge so that they can problem solve at home eg an error came up on the machine, what do I do now? (CDE 18)

Utilising knowledge for problem solving was common among the CDEs as an example of utilisation: “once the session is coming to an end give them an example and see if they are able to problem solve” (CDE 22).

The other common statement attributed to this category was the idea of the learner showing the CDE how to perform and blood glucose test: “I get them to do a return demonstration and <u>discuss</u> their performance” (CDE 21).

The CDEs referred to this as an opprtunity to check their technique and understanding about the procedure. However, as a learner activity it is significant as an opportunity for the learner to utilise the new knowledge and re-inforce the links in their knowledge networks.

Attention

The eighth category in the COATSRU**A**M framework is attention. In this framework, attention is viewed as a limited but allocatable resource that can be directed by the learner towards the demands of the task or divided between tasks. The greater the number of tasks, the greater the cognitive load of the learner. This category was identified in CDE statements when the CDE indicated the complexity of the new information or the importance of not overloading the person with new information.

The range of statements allocated to this catgeory was 7.7–16.7% with a mean of 12.8%. This middle level understanding about cognitive load is important given the extent of the information which could be included in an education session about blood glucose monitoring. This was well captured by CDE 7 in their statement: “Phew, when you write it down, you realise how much their [sic] really is, no wonder it can take up to an hour!!!” (CDE 7).

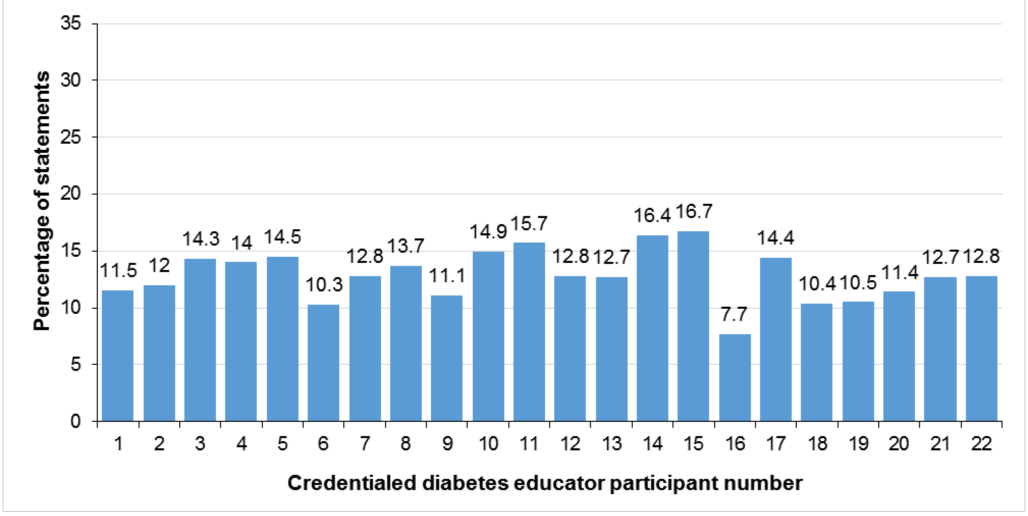


Figure 7.15: Percentage of statements about the attention learner activity category in the COATSRU**A**M framework for CDE 1–22 in Study 3.

As indicated by CDE 9, the need to allow the learner to learn at their own pace can also be related to the important idea of cognitive load: “not rushing them … it is important to spend the time with them initially and follow up to get good results”.

CDE 9 recognised that by not rushing the learners, they have time to deal with the content and then move on to a new idea thus not overloading them cognitively or dividing their attention between too many new tasks.

The extent of possible information to be included in a diabetes education session was well recognised by CDE 15 when he noted the need for an expert health professional: “Diabetes is extremely complex and it takes an expert to unravel all the management regimes and complications”.

The reference to expertise is significant here for three reasons. Firstly, it recognises the complexity of diabetes management thus highlighting the need for high quality education to enable self management. Secondly, whilst it implies the need for expertise in the content of diabetes management it does not explictly identify the need for expertise in education, or specifically in learning, which is crucial if people with diabetes are to self-manage successfully. Thirdly, the volume of information required for diabetes self management requires a diabetes [and] education expert who can adjust the education to avoid over-load, enable the learner to ‘attend’ to important information and construct knowledge for independent self management.

CDE 21 identified the issue of attention clearly in her statement about other issues adding to the cognitive load: “Have time, Not have other issues constraining their ability to concentrate”.

Other issues could be personal concerns or the person thinking about how they will manage at home when also trying to learn about blood glucose management.

> People who are not interested in the topic and unwilling to learn are unlikely to be actively engaged or to test after the session finishes. So the DE may have to unpack a whole range of issues about why they do not want to test or learn how to test BG, which might have their basis in past experiences, fear etc. (CDE 21)

The CDEs recognised the importance of people's lives beyond their diabetes and how it can impact on their learning.

> Find out History/social situation What they know about diabetes If they want to know anything Cognitive level how much they are prepared to be involved in self management. (CDE 4)

CDE 5 also noted that some people have significant fears which increase their anxiety to a level which impedes their learning.

> Through discussion with client to see if BGM would be helpful to them in their diabetes management. They may have a needle phobia and/or get so uptight about pricking their finger that it would be counter productive. They may get upset and anxious that every reading defines them as "good or bad" – again counter productive. They may just decide they don't want to – maybe for financial reasons, or they feel they are too old or infirm or just not interested. Pointless doing BGM unless willing and able. (CDE 5)

Management

The final category of the COATSRUA**M** framework is management. This category is about how effective learning and problem solving is under the control of the learner. The learning is managed or self-regulated and involves the learner checking, revising, evaluating and reflecting. It also involves the learner taking responsibility for their learning which can be evident in effective self management.

In Study 3, the range of CDE responses in this category was in the middle range (mean - 11%) with specific email interview questions seeking understandings about what learners and CDEs can do to assist learning.

Question 4:	Tell me how the person with Type 2 diabetes will learn about BGM?
Question 5:	What are the most important things you will do as a diabetes educator to help this person learn effectively in this session?
Question 6:	What are the most important things the person must do in this session to learn effectively ?

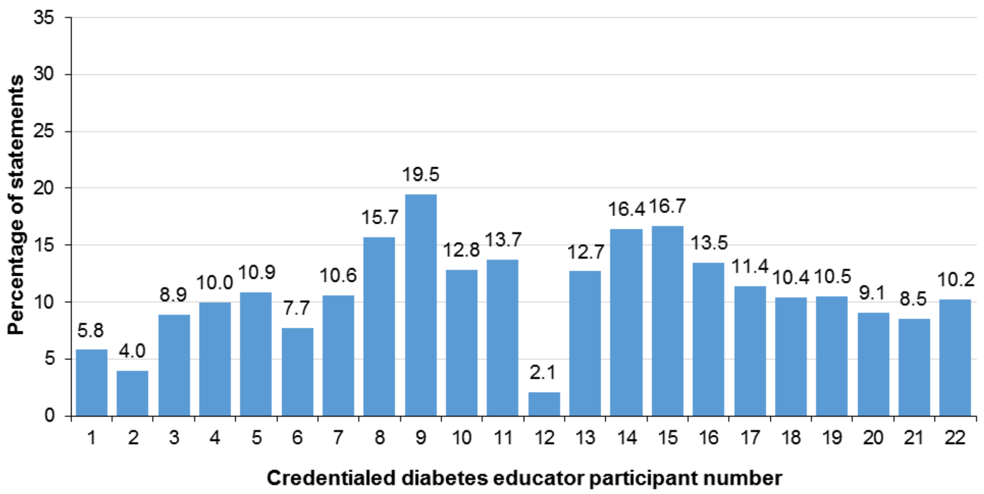


Figure 7.16: Percentage of statements about the management learner activity category in the COATSRUA**M** framework for CDE 1–22 in Study 3.

CDE 14 identifed the learner asking questions as indicative of their reflection and evaluation of their understanding: “If a person asks questions then they are curious about the process”.

This perspective was also supported by CDE 15 who combined the idea of a learner evaluating their understanding and owning their diabetes: “ask question to validate understanding … Take ownership of the diabetes and a willingness to control it”. A slightly different perspective was provided by CDE 3 who said she would “ask them what they thought/wanted to know about their BGLs”.

This approach by the CDE initiates a way of thinking by the learner to reflect on their understanding and be responsible for their learning. Most CDEs also talked about the patient (learner) being empowered which can also be an example of the category of management in the COATSRUAM framework: “Empowerment means to take ownership of the task” (CDE 7).

The concept of empowerment is highly valued among diabetes educators and often equated with the patient or learner taking control of their diabetes and health. This perspective is presented below by CDE 18.

> It is important for clients to understand that they are the ultimate person in charge of their health. Empowering them to have a say in their diabetes management, to understand why the health professional would ask them to self-check their BGL’s is important for them to take control of their own health as they are the ones who will benefit or be disadvantaged in the long term. (CDE 18)

Summary

In summary, the COATSRUAM analysis was used to identify statements made by the CDEs about what they do to assist learner activity for ongoing diabetes self management.

There were three categories for which some participants did not record any codes namely, transformation (2), storage (4), and retrieval (5). Along with Utilisation these were the categories where low frequency of responses occurred and in terms of frequency of activity, this pattern of responses does point to an issue of concern.

The low frequency in these categories suggests that the CDEs would be less likely to provide patients with guidance in how to encode the new knowledge about BGM and how to address problems in the use of that knowledge in their management of that part of their diabetes related to the BGM outcomes.

There was a greater frequency of statements about Orientation and Attention by the CDEs. This potential over concern in two areas of learner activity raises questions about why this occurred and if the CDEs are aware of this emphasis. This is not to suggest that these elements of processing are unimportant, but it does suggest that the attention given across the range of learning processes was not well balanced.

All aspects of the COATSRUAM categories of learner activity are important for the complex processes involved in learning. If the learner is not transforming and encoding information into useful knowledge representations that can be stored, easily retrieved as required and utilised in a variety of unpredictable situations then the learner is unlikely to be able to truly self manage their diabetes.

In this study, the teacher classification category related to knowledge of learning was high. However, in the COASTRUAM categories which drills down into the more detailed understandings about learner activity we see it was most frequently discussed in the areas of orientation and attention and not in some of the very important knowledge construction areas of transformation, storage, retrieval and utilisation. The next section of this chapter looks at the quality of these statements which is important if the CDE is to provide a range of approaches to learning for different people in different settings.

Quality

Quality rating of statements about teaching (emails)

This section provides an analysis of the email interview statements from the 22 CDEs. These are the same statements as analysed in the previous two sections where the focus was the CDEs knowledge of teaching (Shulman's [1986a] classification) and learning activity (Lawson's [2000] COATSRUAM framework).

The findings in this section were derived from the use of the four point quality rating scale discussed in both Study 1 and Study 2. The highest rating on this scale identifies thinking that shows that the understanding of the participant is embedded within an explicit theoretical framework. The presence of this explicit theoretical framework provides an important level of conceptual power to the understanding in that it can enable the participant to generate relationships or procedures for situations in teaching that might be novel and have not been experienced previously.

The quality of the CDE statements is significant because it reflects the extent to which the CDE has a developed theoretical framework about teaching and learning. It is this knowledge and understanding which forms the CDEs accessible framework or model of teaching and learning that is assumed to guide their teaching actions in the diabetes education session. It is expected that the more developed and coherent their models of teaching and learning, the higher the quality of their statements and the more effective will be their teaching actions.

The analysis procedure used to code the quality of the statements made by each of the CDEs is the same as that used to generate quality ratings in Studies 1 and 2, using the following 4-point scale:

1. **Statement only**
   Simplistic, broad or general statements.

2. **Statement + example**
   Beginning understanding, provides an example but no justification or relating of the statement to theory, OR use of specific terminology or jargon but without an example.
3. **Statement + justification**
   Provides a rationale for choice of action, more elaborate, gives a purpose for the action or idea.
4. **Statement + justification and link to theory**
   Higher order thinking, provides a rationale with theoretical foundation and explanation, demonstrates active or deliberate choice of action based on a theory.

The table below shows a graphic representation of the outcome of coding using these four levels of quality. The bars represent the proportions of statements at each of the levels as a percentage of each CDEs' total number of statements.

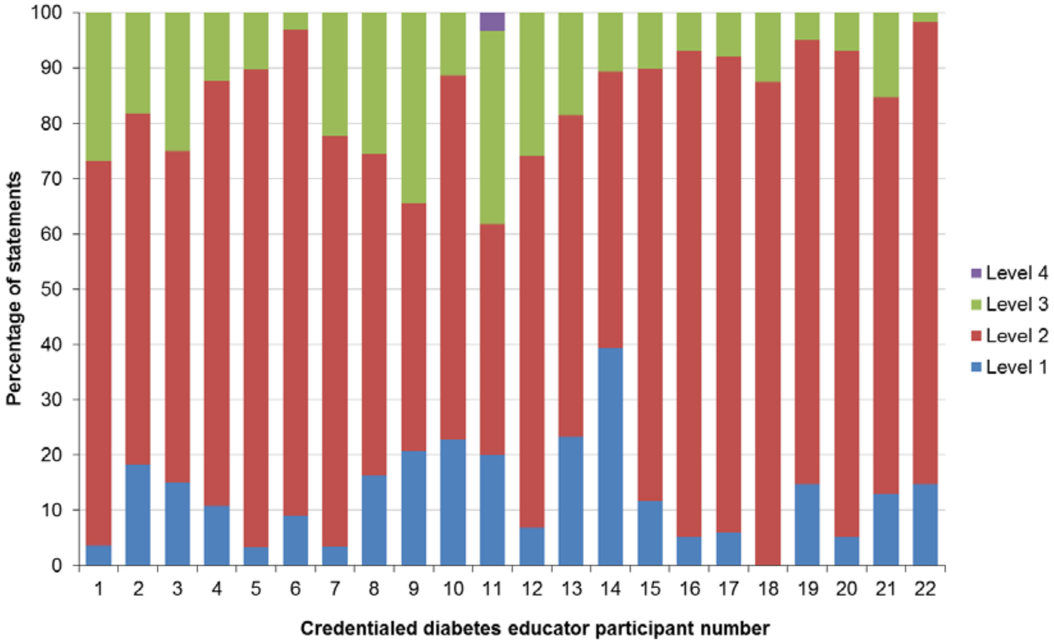


Figure 7.17: Percentage of participant statements in each of the four quality rating levels.

The following table provides the mean frequency scores for each of the four levels of quality rating. The table 7.9 clearly shows the majority (71.8%) of statements made by the CDEs were rated as level 2.

Table 7.9. The mean scores for the four levels on the quality rating scale

	Quality rating			
	Level 1	**Level 2**	**Level 3**	**Level 4**
Mean	11.6	71.8	12.5	0

There were 18 CDEs for whom the majority of statements were rated as level 2. So the great majority of the statements made by these participants about teaching and learning were statements that identified an action that can be classified as a teaching action and is accompanied by an example that elaborates on the action.

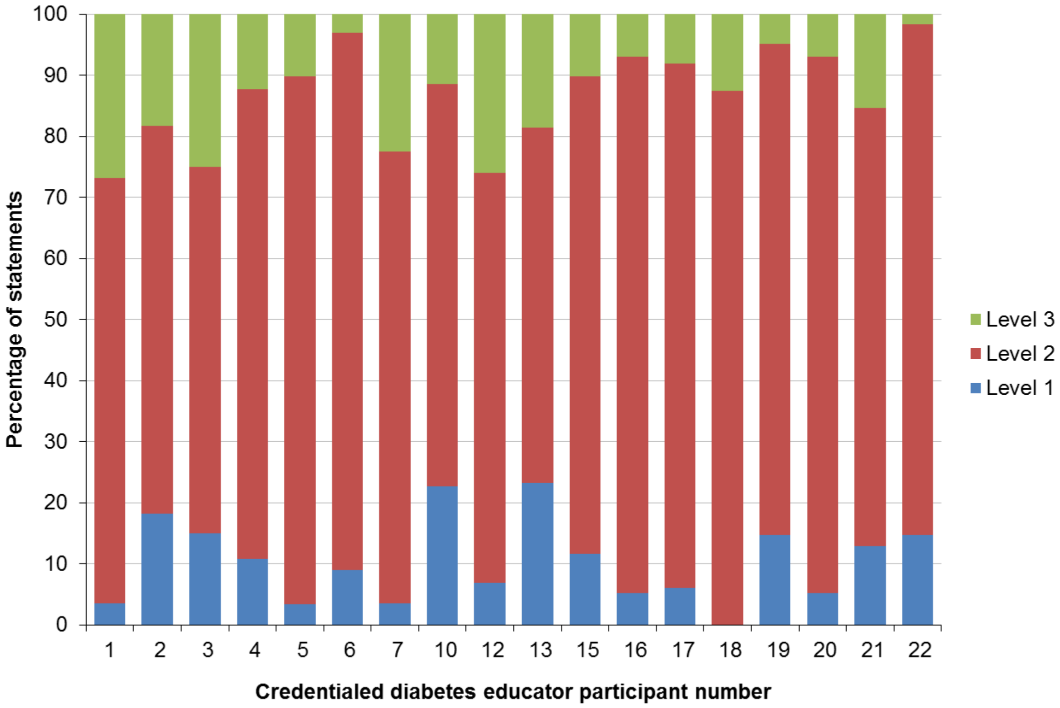


Figure 7.18: The 18 CDEs who provided the most statements rated as level 2.

The median frequency at quality rating level 3 was 12%. While all participants received ratings at level 3, there were only seven with over 20% of statements at this level (see Figure 7.19) and there were six with less than 10% of their statement being given this rating.

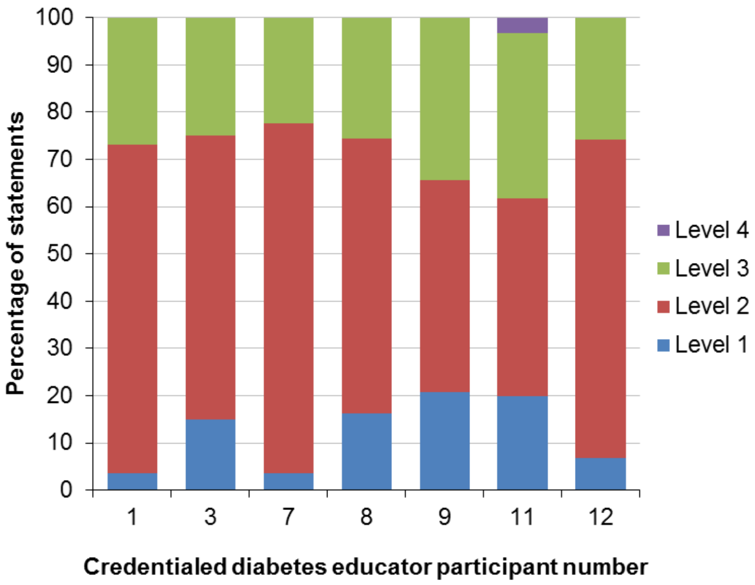


Figure 7.19: The 7 CDEs with more than 20% of statements rated as level 3.

Of particular note was that there was only one participant with any rating at quality level 4.

Level 1

The lowest quality rating, level 1, where participants provided simple or general statements, was low scoring overall.

The level 1 quality rating was attributed to a small number of statements across the cohort of 22 CDEs in this study. The lowest number of level 1 statements was evident in CDE 18 responses with the largest number made by CDE 14.

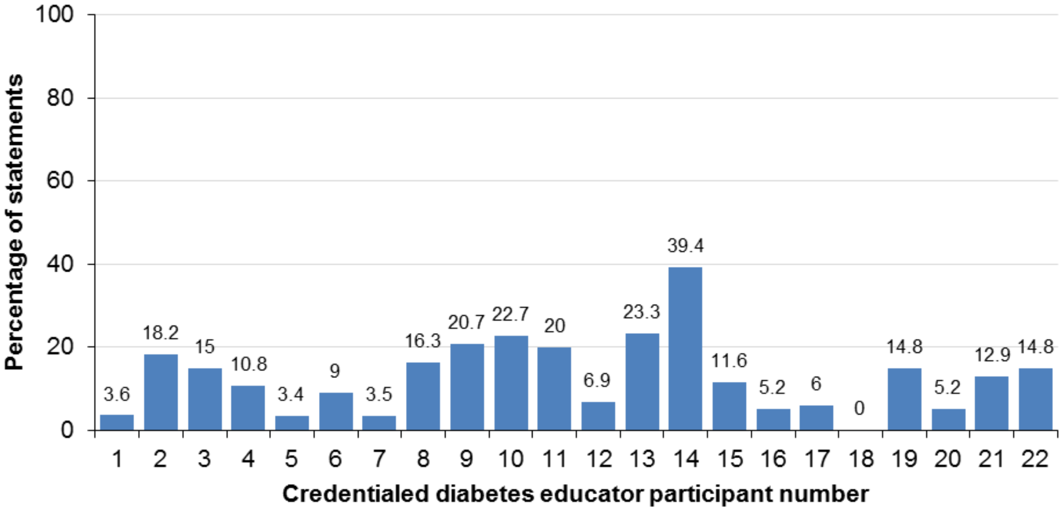


Figure 7.20: Percentage of participant statements in quality rating level 1.

Given that quality level 1 is the lowest level rating, it would be preferable that there were relatively low frequencies of statements at this level.

Examples of quality rating level 1 are provided below:

> The patient will learn from observation. (CDE 1)
>
> Have a variety of instructional skills and strategies. (CDE 9)
>
> To explain the patho-physiology of Diabetes Mellitus. (CDE 14)

In each of these statements the CDE provides a statement only. There is no example, no elaboration or explanation or justification provided. In summary, this level of rating was less than 40% for all participants (mean of 11.6%) and under 23% which is low for the majority of the participants.

Level 2

The second rating, level 2, was given to statements which provided an example or description of the teaching activity. This generally rated highly for most participants with all but one 1 getting more than 40% (mean of 69.6%) of their statements allocated to this level.

> I think it is important that the client has a good understanding of the process, they are encouraged to question and verbalise their concerns and hopefully they are comfortable to do this. (CDE 2)

Three participants were allocated 87.9% of their statements at this level. This is not surprising as use of examples is a way for the CDEs to describe their teaching actions when they don't have the specialist vocabulary to articulate the theory underpinning what and why they are teaching in a particular way.

> Discuss and show the lancet device first: placement of the lancet; how to 'load' and fire the device. (CDE 20)
>
> Go through how to test, times to test, what to look for etc. If they are not interested in testing it is their decision and I would respect their decision. (CDE 6)
>
> They are taking responsibility/ownership of their management by utilising a tool that can give them feedback on their management. (CDE 16)

A further five participants rated between 80.3 and 86.4% of their statements at this level.

> By taking their blood sugar at the time and explaining all the things that can influence it i.e. food (amount and types), emotions or stress and exercise. (CDE 5)
>
> help to alleviate any errors that may occur such as incorrect high or low BGL's, glucometer not working / error, misuse of equipment, eg enough blood on strip, etc. (CDE 19)
>
> With different learning styles some people like to watch and then do. (CDE 22)

These examples show that in quality rating level 2, statements provided include an example or description of the teaching activity.

The remaining participants provided between 41.7% and 69.6% of their statements at this level. One participant (CDE 8) provided only 11.6% of their statements at this level.

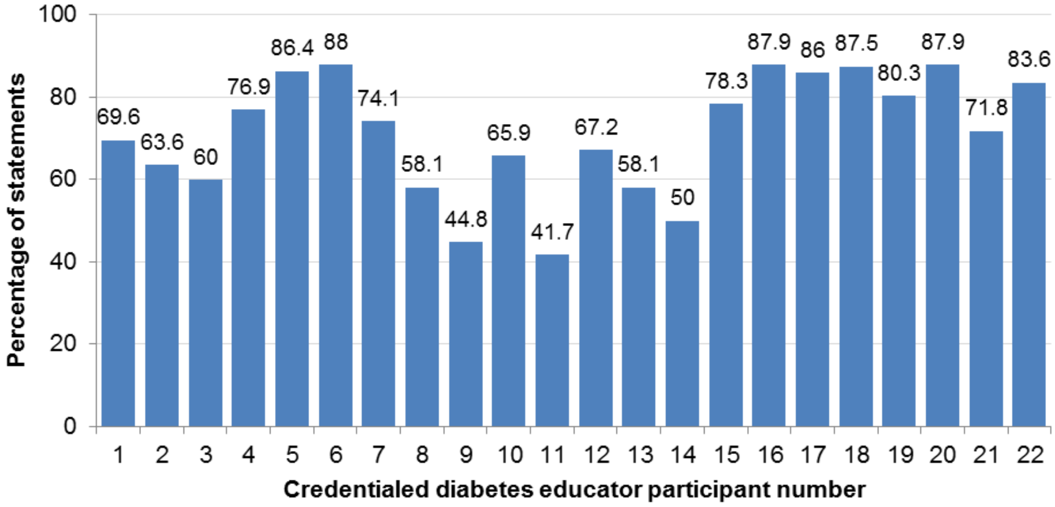


Figure 7.21: Percentage of participant statements in quality rating level 2.

Level 3

In the level 3 quality rating, the range of statements attributed to this level was 1.6–35% with a mean of 12.1%. There were two participants who provided justifications for over 34% for their statements

> All the points mentioned in Q5 are important because if a client is not ready to learn or has another pressing issue it is difficult to teach them and a good teacher should be able to pick this up and address the problem if necessary or allay their fears or anxieties. (CDE 9)
>
> I encourage my clients to ask questions and tell me what they already know about finger testing and what their concerns may be about it so I am able to alleviate any concerns or worries before they leave the sessions. (CDE 11)

A further 4 participants rated over 25% for this same level. Most statements in this category provided a justification of why the CDE discussed management issues from the perspective of the client.

> I open up conversation to discuss what the client thinks they can learn from blood glucose monitoring therefore getting them to think how can doing this benefit me, rather than they test to please the Diabetes Educator or the GP. (CDE 1)

In this example, CDE 3 is walking us through her reasoning for explaining why blood glucose monitoring is important and why the person needs to understand why she recommends they monitoring.

> If they understand why they need to do something then it makes what they are doing make more sense and they can learn more about their own glucose responses. (CDE 3)

Some CDE's made it clear that people with diabetes will do what they want irrespective of what the CDE recommends. With this in mind, CDE 8 justified her approach to educating a person about the benefits of monitoring.

> After leaving my office, people are only going to test their own BGLs if they make their own decision that they want to do this in the first place. So first and foremost people need to make that decision before the session progresses any further. In order for people to decide they need information. I present the pros' and cons' of participating in HBGM and the patient makes a decision. (CDE 8)

CDE 12 identified the need to explain each piece of equipment as the first step in teaching blood glucose monitoring. This was justified by acknowledging that the equipment is usually foreign to most people.

> The materials and meter are usually completely foreign to them – so I need to introduce them to each item and explain what it does, then show them. This is the first step to the person to be able to undertake this for themselves. (CDE 12)

However, six participants rated less than 10% for statements with justification for their teaching.

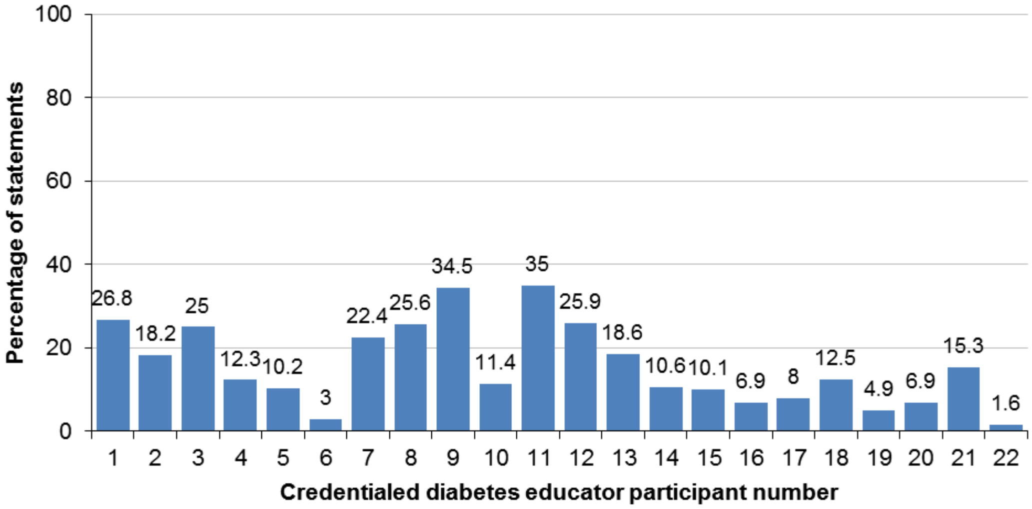


Figure 7.22: Percentage of participant statements in quality rating level 3.

Level 4

Where statements were categorised as level 4 in terms of the quality scale, it meant the CDE provided statements that could be reasonably linked to some element of a well developed model of teaching and learning, one that would enable them to generate strategies as required in the unpredictable environment of diabetes education.

The only CDE to have a statement rated at this level was CDE 11. Interestingly this participant is one of the allied health participants in the study.

> Adult learning is less about the traditional class room model for learning where one person tells the rest of the group what needs to happen in almost a dictation role. Adult learning is about the exchanging of ideas between parties so I encourage people to share experiences, fears, knowledge that they may already have and to ask questions and also to feel free to ask me to re-explain or repeat things or to slow down my speed of talking etc. (CDE 11)

This participant also scored well for statements that demonstrated general pedagogical knowledge in the Shulman (1986a) classification analysis.

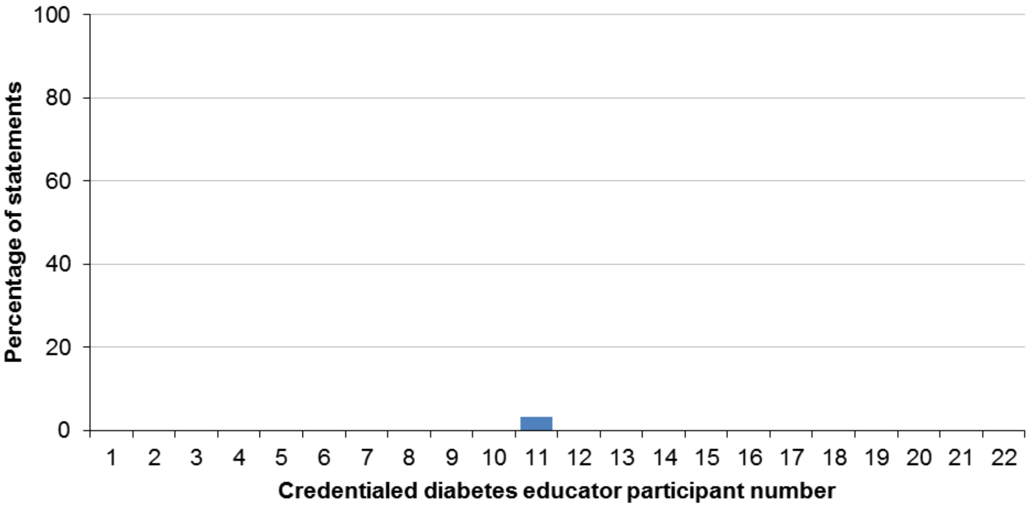


Figure 7.23: Percentage of participant statements in quality rating level 4.

Summary

The analysis of the quality of the CDE statements has identified that the majority of these CDE participants provided statements which were classified as level 2 (70%) where the extent of the elaboration is by way of an example. There was a much smaller proportion (12%) where justifications were given, providing evidence of a more complex understanding about learning processes. This means they provided examples and a justification or purpose for their action but they were not able to provide any theoretical explanation. Their statements lacked a reasonable theoretical base about learning and indicated their knowledge base for teaching was impoverished.

There was just the one participant who provided a response that could be related to a more extended framework that has been labelled as more theoretical. The results of the quality ratings of the CDE statements identify the limitations of the CDE to utilise a theoretical base in their teaching and learning. This means they are limited in their choice of strategies and approaches to learning situations as they arise within a diabetes education session. It is this aspect of this research which is most significant and indicative of the direction required for ongoing education with credentialed diabetes educators.

Given this analysis of the quality of their statements it is less likely that the design of the education session will avoid possible problems such as excessive cognitive load or the storing of fragmented knowledge. It is also less likely that the CDE will generate effective solutions to teaching/learning problems that emerge during a session, such as a patient having misconceptions, or having inaccurate knowledge of how to insert a test strip in the blood glucose meter.

This will not set up the patient in a powerful way for subsequent self-management.

CDE: Theme Analysis

In this initial analysis of the interviews with the 22 CDEs the understandings about their roles fell within a small range of options about aspects of teaching and learning. This next section provided examples of the different CDE responses to the email interview question:

> Imagine you are about to run an individual session on Blood Glucose Monitoring (BGM) for a person recently diagnosed with type 2 diabetes. What is your role in working with this person in this session on BGM?

Understandings about the CDE Role

Some examples of the CDE understandings about their role can be seen in Table 7.10 where key terms used by the CDEs in their response to the first interview question are listed. These terms were then explored further in the second email interview and provide more detail about their understandings of their role.

Table 7.10. Key terms identified in first email interview

Participant number	Question 1a response
1	facilitate ownership of the process
2	ensure the patient understands
3	Explain
4	find out
5	help them understand
6	help them
7	empower patient with skills
8	ensure they understand
9	teacher
10	teach the client
11	explain
12	Assist the client to know
13	educate the person
14	inform the patient
15	explain
16	see and hear by asking questions
17	provide information
18	establishing therapeutic relationship
19	empowering in self-managing
20	educator
21	understand the person
22	assist the patient in gaining knowledge

Other examples of role descriptions provided in the interviews by the CDEs:

> Ensure the patient can use the monitor competently (CDE 1)
>
> To educate (CDE 4)
>
> Discuss and assess (CDE 5)
>
> help them understand (CDE 6)
>
> To explain the aims & purpose of regular monitoring & empower patient with the skills for self monitoring, recording & interpretation of results (CDE 7)
>
> assisting the client (CDE 12)
>
> ensure client is safe and proficient (CDE 16)
>
> establishing therapeutic relationship, teaching new skills, promoting self management (CDE 18)
>
> build rapport (CDE 21)

Among the responses many CDEs were quick to identify the importance of “allowing” the person with diabetes to choose whether or not they wanted to monitor. If the person chose not to monitor, then the CDE role was to provide information about monitoring to the person to ensure they could make an informed choice.

> to explain/demonstrate what monitoring is and how it is done. Also explain although we consider it very important, they have the right to choose whether they monitor or not. (CDE 3)
>
> They may just decide they don’t want to – or just not interested. (CDE 5)
>
> Some people do not want to monitor and will voice this. If they do not want to, the session will revolve more around explaining why it is important and how the results are used. In some cases the individual may need time to think about this before they can progress to learning monitoring. (CDE 22)

Several also went on to say they would continue to encourage the patient to monitor through ongoing information and explanations.

> if patient has indicated verbally or by body language that they are not interested at this stage to monitor their Blood glucose levels then no amount of demonstration / or handouts will be effective. I would then arrange another time to meet and have given them something to think about before our next meeting. If patient asks further Questions and asks to use a meter then this is supported. (CDE 14)
>
> If they are not interested in testing it is their decision and I would respect their decision. At their next visit I may discuss it again as sometimes after people have had time to think about the information they might change their mind. (CDE 6)

An interesting response to the question about the CDE role came from CDE 9. When asked about her role, CDE 9 identified it as “Health worker/teacher/support person” in her initial email response. When questioned again about what she meant by “teacher” she stated:

> The teacher is the expert. This means she should be able to assess the situation and needs of the client, their readiness and ability to learn and adjust her teaching regime to suit that client. She should be able to motivate the client to learn and take responsibility for the self-management of their disease.

Here the role is identified as that of an educational expert with highly developed skills in assessing learning situations, assessing the client readiness and ability to learn, and able to adapt teaching strategies to individualise patient education sessions. As long as this idea of teaching is more elaborate than just telling this is a potentially effective approach to learning. However, there is also acknowledgement that the learner (PWD) is responsible for the management of their diabetes and the CDE needs to motivate them to do this. There is no suggestion how this could be done.

The suggestion that the teacher has a responsibility for motivation of the learner suggests the locus of control for the motivation to learn is situated within the diabetes educator. This extrinsic motivation rather than intrinsic is not congruent with long term self-management and the patient taking responsibility for their diabetes and acting as needed to keep their diabetes under control.

The ‘teacher as [an educational] expert’ and motivator for self-management is recognised as a difficult aspect of education in health care as many ‘patients’ come to a health care agency to receive health care and be told what to do to get better. In chronic condition self-management education, such as diabetes, the person needs to be given individualised diabetes management information and problem solving skills on which to base their long term self-management and daily decision making.

Understandings about the patient role

There were many examples of patient roles among the 22 CDE participants in Study 3. Some examples are provided in Table 7.11 in response to a brief paragraph to set the scene and question 2. The colour coding identifies the groupings of similar words and themes.

Setting the scene

Again, imagine you are about to run an individual session on Blood Glucose Monitoring (BGM) for a person recently diagnosed with type 2 diabetes.

Question 2: What is the role of the person in this session on BGM?

Table 7.11. Key aspect in response about role of the person with diabetes

CDE	Response
1	Learn to take responsibility.
2	understand
3	Make an informed choice
4	learn
5	decide if BGM is for them
6	learn how to do it
7	have confidence
8	decide
9	student
10	actively listen
11	learn
12	take on board the education
13	listen
14	display interest
15	ask lots of questions
16	problem solve
17	be educated
18	increasing knowledge
19	listening
20	be comfortable
21	the role of the person with diabetes
22	try to develop the skill

Note. CDE = credentialed diabetes educator.

As is evident in Table 7.11, the CDEs shared understandings about the patient role which included learning, listening, confidence, increased knowledge, problem solving, being a student, asking questions and developing the skill. These words and phrases were identified as key responses to the interview question about the patient role. More detailed understandings about these terms were then pursued through the second round of email interview questions.

The table above also shows some groups of similar responses which have been colour coded into themes. CDE 1, 3, 5, 8, and 12 were grouped for responses related to taking responsibility and patients making their own decisions. Three CDEs (7, 14, and 20) used words to describe the role of the patient in terms of their motivational state while a number of the CDEs (2, 4, 6, 11, 17, and 22) described the patient role as a general view of learning. CDE 10, 13, 15, 16 and

19 described a specific process for the patient role related to being a learner while CDE 9 and 18 used more traditional descriptions. CDE 21 did not answer the initial question about the patient role in the first email interview.

When asked about the role of the person in the first interview CDE 9 identified that role as being a client or student. The second email asked for more information about the use of the word *student* by asking: Can you tell me more about what this means and how they would do this? The response was:

> The student needs to recognize [sic] that they are there for a purpose and to accept responsibility for the self-management of their disease. They should also ask questions if they do not understand what they are being taught.

The focus here is on the responsibility of the person for management of their diabetes. This responsibility includes the expectation that they will ask questions to gain a better understanding of how to self-manage their diabetes. At this stage there was little information provided about the learner's skills in questioning, self-management or problem solving. There is also no information of any negotiation or instruction about this role expectation.

The language used to describe what the student needs to do is direct and clear about what they need to do - "the student needs to recognise that they are there for a purpose". What is not clear is how the student/patient 'learns' of the purpose of their presence at the session. It could be suggested that a power differential exists here and that there is an underlying "you will learn what I tell you" implication. It could also be that there is no clear role for the learner, or it is not well understood.

This understanding about the role of the patient involving taking responsibility was supported by CDE 1 and the idea of asking questions was supported by CDE 15. CDE 16 also identified that the patient needs to be a problem solver.

Understandings about Teaching

The question about how you will teach the patient was asked to elicit information and understandings about teaching without directly asking: What is teaching? If the CDEs were asked: “What is teaching?”, the responses may have been more like a definition rather than the CDEs understandings about teaching.

CDE 9 identified some key elements of teaching in her responses stating that teaching involves “steps and practice of new skills” and “explanations and facts are important”. Reference materials for later are identified but there is no indication how they are used in the teaching.

Details about the significance of some aspects of content are identified in terms of their difficulty. Achieving understanding of difficult concepts are identified as valuable for empowerment and thus self-management.

> Most glucometers are very easy to use these days, however it is still important to take them through the steps , not rushing them, letting them have a go at doing it.I then explain the do’s & don’ts etc clean dry hands,in date strips, calibration and care of the metre. They also have their instruction manual to refer back to. I think it is most important that they have a good understanding on when and why they need to check their bgl. I always make it very clear how their blg relates to food and how they can tell if they are having too big a serve of carbohydrate at a meal by their 2hr post prandial bgl. Most clients find carbohydrate portions difficult to grasp, so it is very helpful in that regard and it empowers them to self manage. (CDE 9)

The importance of time to teach difficult concepts and then follow-up is identified as a means to getting good results. No specific amount of time is mentioned.

Clear instructions for documentation of results is important.

Review of results and progress is an important element of teaching and ongoing support is a focus of this.

> I have also found it useful with weight loss. When they start to reduce their carbohydrate intake to control their bgl they start to lose weight, so it is important to spend the time with them initially and follow up to get good results. Most of my clients have Type 2 Diabetes, so initially I ask them to do their bgls first thing in the morning and than 2hrs after meals. I give them a diary that has these times clearly set out and ask them to record their readings. If they have a high bgl reading they should reflect on what they had eaten that could have caused it make adjustments as necessary. I usually see them again after one week to review their

> progress and offer advice and support. Once I'm happy with their bgl readings they need only check their bgl daily. Most GPs are happy for them to check their bgl twice weekly if well controlled on diet only. (CDE 9)

Another question designed to elicit the CDE understandings about teaching was to ask about the most important things they will do as a diabetes educator to help this person learn effectively.

The emphasis here was on the CDE actions that were to positively affect learning. CDE 9 identified the following actions:

> Have a variety of instructional skills and strategies
>
> Recognise the learners educational needs
>
> Allaying their anxiety
>
> Present information that is meaningful to the client
>
> Recognise the client's needs and concerns, allowing time where needed to deal with pressing issues and providing encouragement

CDE 9 has demonstrated that she understands the importance of having a repertoire of teaching skills and strategies. She expands on what they might be in her second interview.

> By this I mean that all clients are unique so you may need to make adjustments to a set educational tool to suit each one.
>
> Using a variety of teaching aides Videos, demonstration, written material, diagrams etc may be necessary to help them understand the concept.

The above response suggests CDE 9 understands the need to individualise education and that teaching involves different modes of information provision. She has identified that anxiety can interfere with learning and thus teaching is unlikely to be effective if the person with diabetes is anxious.

> All the points mentioned in Q5 are important because if a client is not ready to learn or has another pressing issue it is difficult to teach them and a good teacher should be able to pick this up and address the problem if necessary or allay theirs fears or anxieties.

Understandings about Learning

In the email interviews, CDEs were asked how the person with type 2 diabetes will learn about BGM. In this response CDE 9 identifies that learning involves steps and should not be rushed. She notes that learning occurs when learners ‘have a go at doing it’. Learning involves going back over content via the instruction manual and the importance of understanding is emphasised.

CDE 9 promotes the importance of the learner knowing why they have to do things and how things relate to each other. This is stressed as important for the learner to make judgements about management beyond the education environment.

There is recognition that some aspects of diabetes management are difficult but that learning them can lead to improved self-efficacy and thus empowerment.

> Most glucometers are very easy to use these days, however it is still important to take them through the steps , not rushing them, letting them have a go at doing it.I then explain the do’s & don’ts etc clean dry hands,in date strips, calibration and care of the metre. They also have their instruction manual to refer back to. I think it is most important that they have a good understanding on when and why they need to check their bgl. I always make it very clear how their blg relates to food and how they can tell if they are having too big a serve of carbohydrate at a meal by their 2hr post prandial bgl. Most clients find carbohydrate portions difficult to grasp, so it is very helpful in that regard and it empowers them to self manage

Time to learn and opportunity to review results is recognized as important in learning.

Reflection is identified as an effective learning strategy and as a pathway to self-management.

> I have also found it useful with weight loss. When they start to reduce their carbohydrate intake to control their bgl they start to lose weight, so it is important to spend the time with them initially and follow up to get good results. Most of my clients have Type 2 Diabetes, so initially I ask them to do their bgls first thing in the morning and then 2hrs after meals. I give them a diary that has these times clearly set out and ask them to record their readings. If they have a high bgl reading they should reflect on what they

> had eaten that could have caused it make adjustments as necessary. I usually see them again after one week to review their progress and offer advice and support. Once I'm happy with their bgl readings they need only check their bgl daily. Most GPs are happy for them to check their bgl twice weekly if well controlled on diet only.

The idea of learning occurring by "letting them have a go" was pursued in the second interview. The response identified the significance of evaluating learning and ensuring the learner is capable of doing the activity. The role of confidence in learning was suggested as being achieved when the learner was successful. This was seen as positive for when the learner was required to repeat the activity independently and away from the teacher.

> This is a means of evaluating if the student understands what you have told/shown them and weather they are capable of doing it. This will also give the student the confidence they need to take home

When asked about "the most important things a learner can do to learn", the notion of taking responsibility was foremost in this CDEs mind. Asking questions and paying attention were similarly identified as central to learning.

Cooperation with the teacher was mentioned as significant but not pursued and thus unclear in terms of how it helps learning.

> Be prepared to take responsibility for their condition, ask question if they don't understand, try not to get distracted be ready to learn and cooperate with the teacher.

When asked about "the most important things a learner can do to learn", the idea of having a good understanding was pursued in the second interview. The response was limited to:

> I mean it is important that they understand what Type 2 Diabetes is and why they are doing their bgls and what it means.

This response does not provide any further information about the CDEs understanding about learning other than to reinforce an earlier point about relating pieces of information.

The absence of further detail may indicate a limit to the CDEs knowledge about how learners understand things. It may also be a reflection of the question and limited by the time the CDE had available to respond to the interview questions.

Summary

Study 3 was focussed on the understandings of 22 CDEs in relation to teaching, learning, their role and that of their patient in initial one-to-one diabetes education. The study involved two rounds of email interviews, each with six questions. The second round of questions were designed to seek further information and clarification about the answers provided in the first round of interview questions.

The CDEs provided statements which reflected a wide range of knowledge of teaching, learning and learner characteristics according to Shulman's (1986a) classification of teacher knowledge. The CDEs also demonstrated their understandings of each element in the COATSRUAM framework of learner activities. However, the quality of both categories of knowledge was very limited when analysed using the quality rating scale. Only CDE 11 provided an example of her theoretically based teaching and learning knowledge.

The quality of the understandings held by CDE 11 was higher than the other 21 participants. However, she provided limited examples of this level of knowledge quality.

CHAPTER 8

DISCUSSION AND CONCLUSION

Introduction

In the previous chapters, the findings from each of the three studies were presented, analysed and interpreted. This chapter will discuss the findings in relation to the literature, the research questions and the implications for diabetes educators providing education to people with type 2 diabetes.

The research questions were:

- What is the understanding of the CDE about their role when teaching BGM?
- What is the understanding of the patient about the CDE role when teaching about BGM?
- What is the understanding of the CDE about the patients' role when learning about BGM?
- What is the understanding of the patient about their role when learning about BGM?
- What understandings do CDEs hold about teaching and learning?
- What understandings do patients hold about teaching and learning?
- What is the quality of the understandings held by CDEs about teaching and learning?

This chapter is organised into three main sections around the issues identified in the literature in Chapter 2, the key findings from this research across the three studies, and the implications for the professional learning of CDEs. The chapter finishes with the limitations, recommendations for initial and continuing education of CDEs, and future research ideas.

Background to Study

Type 2 diabetes is a rapidly increasing chronic health condition in Australia and internationally. Nationally, type 2 diabetes affects approximately 4% of the general population (ABS, 2012). If untreated or poorly managed, diabetes can cause major health complications, hospitalisation and early mortality.

Poor management of diabetes is therefore a key issue for national and international health systems. People with diabetes, or their carers, need to be educated about management of their diabetes. Education is critical because diabetes has to be managed 24 hrs a day.

This thesis is concerned with diabetes education as an educational process. It explored the nature and quality of the knowledge of diabetes educators and patients about teaching and learning. This knowledge is significant because it can be expected to have a major influence on how well patients learn about the effective management of their diabetes during the initial education sessions provided in the Australian health care system.

Key Ideas from the Literature

Contemporary diabetes education literature identifies that diabetes education is important and beneficial (Clement, 1995; Brown, 1999; Norris, et al., 2001; Eigenmann & Colagiuri, 2007). A major focus in the literature as presented in Chapter 2 is on the clinical diabetes management content of diabetes education. There is some, limited, concern with the design of diabetes education programs and relatively little systematic investigation of the effects of these designs on the education outcomes (Schinckus et al., 2014). According to Schinckus et al. “there is a dearth of empirical studies investigating Implementation Fidelity (IF) for Diabetes Self management (DSM) programs using well-defined, theory based and valid measures” (p. 20).

In the National Evidence Based Guideline for Patient Education in Type 2 Diabetes, Colagiuri et al. (2009, p. 6) recommend that:

1. All people with type 2 diabetes should be referred for structured diabetes patient education (Grade A)
2. Diabetes education should be delivered in groups or individually (Grade A)
3. Efforts to improve the cost-effectiveness of diabetes care should include patient education (Grade B)
4. Diabetes education should be culturally sensitive and tailored to the needs of socio-economically disadvantaged populations (Grade B)

There is very little reference given to the notion of diabetes education as a teaching and learning activity. These recommendations were followed up with four practice points which were developed from the evidence and included experts' consensus in the absence of gradable evidence.

The National Evidence Based Guideline for Patient Education in Type 2 Diabetes (Colagiuri et al., 2009, p. 6) practice points are:

- Diabetes education, where possible, should be delivered by a multidisciplinary team.
- Education programs should be comprehensive and should include a component on physical activity
- People with diabetes should be encouraged to actively participate in goal setting and decision making
- Educational interventions should be followed by regular reinforcement

The last two practice points reflect the research based knowledge around how people learn by recognising the value of learner activity, goal setting and regular reinforcement. Again, they do not provide information for the diabetes educator about how to teach to achieve the learning. These points are important but they are missing the detail for diabetes educators to implement in their diabetes education sessions.

Because diabetes requires extensive self-care, the focus in recent years has turned to the capacities of patients to self-manage their illness and care processes (Schinkus et al., 2014, p.14). To enhance these capacities, diabetes self-management (DSM) education has evolved to teach people with diabetes to manage their illness and treatment by providing them with the knowledge and skills that are needed to perform self-care behaviors, manage crises, and make lifestyle changes (Clement, 1995, Norris, 2001, Schinkus, 2014, p. 14).

However, diabetes education had not been clearly defined either in Australia or internationally until Eigenmann and Colagiuri in 2007 provided the following definition in their report, *Outcomes and Indicators for Diabetes Education—A National Consensus Position*:

> Diabetes education is an interactive process that facilitates and supports the individual and/or their families, carers or significant social contacts to *acquire* [emphasis added] and *apply* [emphasis added] the knowledge; *confidence* [emphasis added]; and practical, problem-solving and coping skills needed to manage their life with diabetes to achieve the best possible outcomes within their own unique circumstances. (p. 39)

This definition identifies some important features of teaching and learning yet very little research in diabetes education describes in detail the teaching and learning activities undertaken during an education session and the thinking behind the design of these sessions (Schinckus et al., 2014; Leeman et al., 2006; Brown, 1999; Eigenmann & Colagiuri, 2007).

There is a substantial body of research-based literature that is concerned with the nature of teaching and learning available in the broad field of educational research. This educational literature (Hattie, 2003; OECD, 2005) provides insight into teacher activities which are effective for facilitating learning and the effective strategies that patients could use to support the development of knowledge that will help them move toward effective management of diabetes. But at present there is relatively little overlap between the research on diabetes education and the broad literature on education that focusses on teaching and learning. This is surprising given that diabetes education as commonly practiced is clearly a teaching-learning activity, whether conducted one to one or in groups.

The educational research literature points to the major degree of influence that good quality teaching has on educational outcomes. Good quality teaching, based on good quality teacher knowledge, is associated with substantial benefit for learners (Hattie, 2003; Wayne & Youngs, 2003; Ball, 2008). The knowledge and actions of learners also impacts on learning outcomes.

The influence of teacher knowledge, quality of teacher knowledge and the knowledge and action of learners have not been given detailed attention in the field of diabetes education. This research was designed to address this gap in knowledge by examining the understandings about teaching and learning held by credentialed diabetes educators (CDEs) and their patients.

Findings in Relation to the Research Questions Across the Three Studies

Three studies were undertaken to seek information around CDE and patient understandings about teaching, learning and their roles in diabetes education. The interview data was analysed using established criteria to assess the content and quality of teacher (CDE) knowledge about teaching and learning. The interview data from the CDEs and patients were also analysed for their understandings about their respective roles in diabetes education.

This section starts with the patient understandings about their role, the role of the CDE, teaching and learning. Then a discussion of the CDE understandings and the implications for practice are presented.

Patient Understandings

The six patients in this study ranged in age from mid-50 to 70s, with three men and three women. Their different education and employment history was reflected in their statements about teaching, learning, their role and that of the CDE in diabetes education.

Whilst they provided a wide range of statements in response to the research questions, they each provided statements reflecting the following key messages:

- patients are keen to learn;
- patients know to ask questions;
- patients know to listen;

- patients have their own ideas about how they want to learn—CDEs need to ask them;
- patients trust and respect the CDE to tell them what they need to know;
- diabetes is complicated—CDEs need to keep it simple;
- CDEs need to be content experts; and
- CDEs need to teach in a way that is more than what could be read in the blood glucose meter instruction manual.

An important message from these patient interviews is that the patients know they are in the education session to learn. What the diabetes educators need to do is to develop teaching strategies and activities which enable the learner to construct a body of knowledge in a way that they can store, transform, retrieve, and utilise it when needed in their self-management.

The patients identified their role was to learn and apply the new knowledge to their self-management. They recognised the need to listen, ask questions and make sure they understood so they could follow the advice given. The patients recognised they had a level of responsibility in their learning and were able to identify how they preferred to learn. The patients also saw the CDE role as that of knowing the content well and being able to guide them in the best way by giving clues about best management. The patients understood that teaching was about knowledge sharing, building on existing knowledge and skills, and keeping it simple. The patients also had a preference for being shown or by doing something to learn which may be a reflection of the nature of learning blood glucose monitoring.

The patient statements highlight the importance of CDEs talking to their patients about how they like to learn. A successful question used in this research was to ask the patients how they first learnt about a hobby, sport or other activity. This question could be easily incorporated into initial education sessions designed to assess a person’s prior knowledge about diabetes and readiness to learn.

In summary, each of the six patients was a different learner and required different teaching strategies from each of the CDEs. They each held similar ideas about teaching, learning, their role and that of the CDE. However, not all patients felt able to ask their specific questions.

CDE Understandings

This research also provided a detailed analysis of the CDEs' statements to identify their understandings about teaching and learning in initial diabetes education about blood glucose monitoring for people with type 2 diabetes.

The interviews with CDEs provided information about their views on diabetes education and blood glucose monitoring in addition to the data about teaching, learning and their role. Of interest are their consistent views:

People with type 2 diabetes should choose if they want to blood glucose monitor or not. The diabetes educator role is to inform them about the technique, purpose and benefits of monitoring.

- People with type 2 diabetes should be in control of their diabetes management.
- Diabetes management is complex.

These themes were consistent across all of the CDE interviews and conversations with patients in the education sessions and in keeping with the philosophies of diabetes education internationally.

The findings from all three studies show that the CDEs have similar teacher knowledge profiles. There is a spread of knowledge across many categories of the teacher classification system with high frequencies for knowledge about content, general pedagogical knowledge (GPK) and knowledge of learning. There is however, some concern about the low level of pedagogical content knowledge (PCK). The statements attributed to PCK are those that the "tips and tricks" experts know and use to simplify complex learning for the novice learner. Some of the patients also identified this as "keeping it simple", "guiding in the right way" and "explaining and interpreting the information" when they described the role of the CDE. PCK are the key pieces of knowledge associated with expert knowledge and are used to support patients to develop strong knowledge networks and retrieval strategies.

The COATSRUAM framework was used to analyse the CDE statements with a view to predicting CDE activities that influence learning. The CDEs across all three studies provided the most statements in the COASTRUAM categories around context, attention, and orientation which raises the question about whether the CDEs know of their emphasis in this aspect of their education. Whilst not a negative, it does mean the CDEs may not realise the imbalance across the range of learning processes, all of which are important for the complex processes in learning.

However, the CDEs all showed quite low frequencies for knowledge of strategies to assist the learner with transformation, storage, retrieval and utilisation strategies. This is a concern as these CDEs would be less likely to provide patients with education in a manner that enables them to encode the new knowledge for use at a later time to solve problems around blood glucose monitoring (BGM) in their diabetes management. These categories are important for encoding new knowledge and the limited statements by the CDEs highlights the need for more education of the CDEs of how to assist the learner.

Whilst there is evidence of knowledge related to teaching and activities for learning, most were not at the most powerful level of quality.

The analysis of the quality of the statements showed that the CDEs were most likely to provide a level 2 statement with an example or a level 3 statement with a justification. The presence of these justifications suggests a network of knowledge that could be further developed and make the knowledge about learning activity more powerful.

Only two CDEs provided a statement identified as an example of having high quality knowledge with a link to a theory.

The lack of involvement of theory by the CDEs is a significant limitation when in the dynamic environment of a diabetes education session. The wide variety of patients presenting for diabetes education requires the CDE to draw upon a range of teaching strategies. This analysis suggests that CDEs would find it difficult to generate a new strategy or teaching procedure without a more coherent, well-developed model of teaching and learning.

There was limited evidence of a technical vocabulary of learning for many CDEs that paralleled their technical vocabulary about diabetes. It is clear their clinical diabetes knowledge is much greater than their knowledge about teaching or learning.

Overall the CDEs did not provide any theoretical base about teaching or learning which is a serious concern given their role is that of an educator. A restricted knowledge base for teaching and learning reduces the prospect of the CDE generating effective solutions to teaching or learning problems that emerge during an education session. The issue of quality is how it limits the CDEs choices about novel approaches to teaching and learning during an education session because their knowledge is not well developed and thus not well integrated such that they can easily and quickly draw on it as needed.

The CDEs do not appear to possess well developed, coherent frameworks of principled practical knowledge (Bereiter, 2014) about learning. If the teaching is not designed for or responsive to the learning needs of the individuals because of inadequate understandings then the person with diabetes will not be set up with a knowledge network suitable for self-management.

These findings about the types of knowledge and the quality of the CDEs' understandings in relation to teaching and learning is significant because they have not previously been documented and analysed in the Australian context. The findings also provide beginning insights into the patient experience of initial diabetes education and highlight their understandings about teaching and learning.

The complexity of diabetes education and the high stakes of inadequate self-management focus the need for high quality, effective education. If diabetes education is to be effective, then the CDE must have access to well integrated mental models of teaching strategies and learning processes which can be selected at any given moment during an education session.

This research contributes to the body of knowledge about diabetes education by exploring the understandings of credentialed diabetes educators and people with diabetes. The findings raise concerns about the depth and breadth of knowledge about teaching and learning held by credentialed diabetes educators. In addition to this, the findings identify that people with diabetes have varying learning needs and diabetes educators need to recognize and adapt their teaching to aid learning. These concerns are significant because the incidence of type 2 diabetes continues to rise rapidly in Australia and there is some evidence that education of people with diabetes about self -

management can reduce complications, hospitalisations and associated costs of health care. To combat these cost and quality of life issues, credentialed diabetes educators need to improve the quality of their knowledge about teaching and learning to increase the effectiveness of self - management of people with type 2 diabetes.

Limitations

This research has provided initial insights into the state of educational knowledge of CDEs and their patients. As with most studies there are some limitations. Firstly, there were limited numbers of participants who were people with diabetes (patients) and as such the research has provided only beginning insights into the understandings of those six people with diabetes about their role, the role of the CDE, teaching and learning in the context of diabetes education.

Secondly, there are a small number of CDE participants but there is detailed information made available about this group. For Studies 1 and 2, the group was comprised of three CDEs working in a diabetes education centre in a major public hospital and a large community based education service within a capital city. So they are a meaningful group whose characteristics should be seen as significant within the broad diabetes education scene in this capital city. The 22 CDE participants in Study 3 provided a considerably larger range of experience and perspectives from across Australia.

The similarity in patterns of findings across the three studies suggests that the findings emerging from this research may be similar in places beyond the capital city used in Studies 1 and 2, given the CDEs in Study 3 came from other capital cities in Australia.

Thus it is suggested that there is a reasonable basis for regarding the findings from this initial analysis of educational knowledge of CDEs as providing grounds for further research on this topic.

Implications

The aim of this research was to develop an account of the knowledge and understandings of diabetes educators and patients about teaching and learning as a basis for designing on-going strategies to increase the effectiveness of diabetes education.

Potential strategies for effective diabetes education would be to

- provide theory and practice based examples of teaching strategies designed to assist learners to construct knowledge in all accredited diabetes educators courses;
- increase the focus on teaching and learning in diabetes educator role descriptions;
- develop a process for continuing education of CDEs to further develop their understandings of teaching and learning; and
- develop an information package for people with diabetes about their responsibilities as learners.

Recommendations

Time is needed to provide effective education, particularly in the high stakes initial education and for complex education issues such as blood glucose monitoring.

- Communication between CDEs and people with diabetes needs to clarify the purpose of the education session, the anticipated learning and the use of the new knowledge in their ongoing diabetes management.
- Monitoring of learning outcomes for people with diabetes needs to be implemented to evaluate the effectiveness of diabetes education.
- More resources and funding should be allocated to developing the education role of the CDE to improve the quality and theoretical underpinnings of CDEs’ knowledge and skills in teaching and learning.
- Resources should be developed about teaching and learning to enable CDEs to provide effective education for people with diabetes to develop self-management and problem solving skills.
- Incorporate understanding about effective teaching and learning strategies in diabetes into ongoing credentialling requirements for CDEs' ongoing learning needs.

These findings will be disseminated via the peak professional organisation for CDEs, conferences about diabetes education and publications in professional journals.

Implications for Future Research

This study has established an account of the understandings of the diabetes educator and the patient about teaching, learning and their roles in diabetes education. This is a beginning evidence base of diabetes educators' practice and patients' role as learners. Further research to extend this body of knowledge is required.

This study focused mainly on the knowledge and skills of the CDEs in relation to teaching and learning. Whilst there was some data collected from the perspective of the patient about teaching and learning more research needs to investigate strategies to build the learning capacity of people with diabetes.

A similar investigation with larger numbers of people with diabetes could be undertaken regarding their learning and knowledge construction about diabetes.

Investigations trialling teaching strategies designed to assist people with diabetes to construct their knowledge about diabetes management could be mounted and evaluated.

Robust evidence is needed to identify specific strategies which are effective in both one-to-one and group diabetes education.

Evidence about effective “tips and tricks” to assist people with developing new knowledge and skills in diabetes management needs to be shared across disciplines.

Conclusion

This study, to the best of the researcher's knowledge, is the first study that has collected data about what CDEs do when they teach, their understandings about how people with diabetes learn; and the understandings of people with diabetes about teaching and learning.

The study revealed inconsistencies in the time given to diabetes education thus producing learning inequities for people with diabetes. There is a need to develop mechanisms to follow up and review the learning and to evaluate the effectiveness of the education to determine the persons ongoing learning needs.

The findings send a clear message that it is unrealistic to expect people with diabetes to self-manage their condition effectively without, at the very least, adequate education for this independent role and ongoing support strategies. Inadequate education can result in people with diabetes being unable to successfully manage their diabetes at home with potential for hospitalisation or complications if not remedied.

The findings of this study provide detailed insight into the education knowledge and practices of CDEs across a range of situations in both group and one-to-one sessions. The study also revealed the absence of high quality detailed pedagogical content knowledge and skills among the CDEs about learning such that their ability to react to unpredictable learning needs is significantly limited.

The importance of detailed knowledge about learning, encompassing not only provision of information but strategies to store, transform and retrieve the information to guide self-management decisions emerged from the findings. The findings of this study challenge CDEs to realise the significance of developing a detailed body of knowledge about teaching and learning as a core component of their role.

CDEs and other health professionals involved in diabetes education pride themselves on their up-to-date knowledge and skills in clinical diabetes management. This research identified the need for CDEs to place equal emphasis on the development of their knowledge and skills in teaching and learning as a matter of priority.

Appendix 1: Pilot interview

Interview Questions - Pilot

Diabetes Nurse Educator Questions: **Pre - Education Session**

Can you tell me about the education session you are about to do?

- What do you want to achieve?
- How do you think you might go about doing that?
- Do you anticipate any difficulties?
- What will you do about these difficulties?
- What do you think the patient will find most difficult?
- Do you have any specific plans for this session?

  OR

- How do you plan to cover that topic?

Can you tell me about your role in relation to this patient you are about to see?

Can you tell me about what you want the patient to do in this session?

Do you expect the patient to do anything after the session?

Do you see yourself as a teacher?

- What does this mean to you?
- In what way will you be teaching?

Do you see the patient as a student?

- What doe this mean to you?
- In what way will they be learning?

Thanks, I'll talk to you again after the session.

Interview Questions - Pilot

Diabetes Nurse Educator Questions: **Post - Education Session**

Can you tell me about the session you have just finished?

- How do you feel about the session?
- Did you achieve what you wanted?
- Did the patient do what you expected?
- What parts of the session do you feel went well?
- What changes (if any) would you make to the session?
- What do you expect the patient to know/understand after that session?
- Can you tell me what you did that would be an example of teaching?
- Was there anything the patient did that would be an example of being a student?
- Is there anything else you want to tell me about the session?

What will the next education session involve?

How do you plan to cover that topic?

What do think the patient thinks the next education session is about?

How many education sessions has this patient attended?

How many more education sessions do you think they will need?

Appendix 2: Refinement of interview questions

Interview Questions
Version 2

Diabetes Nurse Educator Questions: **Pre - Education Session**

What can you tell me about your role in relation to this patient you are about to see?

Is there a name or label you would use to describe your role?
- a teacher?
- a nurse?
- a counsellor?

What does this mean to you?

In what way will you be a (teacher / nurse/ counsellor)?

What can you tell me about the role of the person in this session today?
What do you want the person to do in this session?
Do you expect the person to do anything after the session?

Is there a name or label you would use to describe the person?
- a patient?
- a student?
- a learner?

What does this mean to you?

In what way will they be a (patient / student / learner)?

Can you tell me what you want to achieve in the education session you are about to do?

How do you think you might go about doing that?

Do you have any specific plans for this session?

Do you anticipate any difficulties?

What will you do about these difficulties?

What do you think the patient will find most difficult?

Thanks, I'll talk to you again after the session.

Interview Questions
Version 2

Diabetes Nurse Educator Questions: **Post - Education Session**

What can you tell me about the session you have just finished?

How do you feel about the session?

Did you achieve what you wanted?

Did the patient do what you expected?

What parts of the session do you feel went well?

What changes (if any) would you make to the session?

What do you expect the patient to know/understand after that session?

Can you tell me what you did that would be an example of teaching?

Was there anything the patient did that would be an example of being a student?

Is there anything else you want to tell me about the session?

What will the next education session involve?

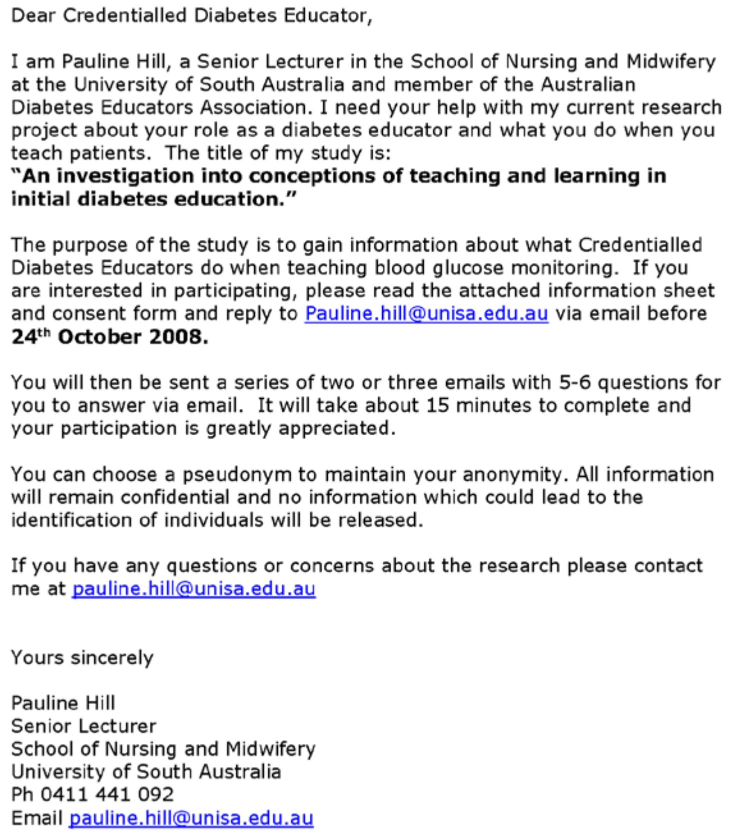
How do you plan to cover that topic?

What do think the patient thinks the next education session is about?

Extraneous Questions
How many education sessions has this patient attended?

How many more education sessions do you think they will need?

Appendix 3: Email Invitation to Participate in Study



Dear Credentialled Diabetes Educator,

I am Pauline Hill, a Senior Lecturer in the School of Nursing and Midwifery at the University of South Australia and member of the Australian Diabetes Educators Association. I need your help with my current research project about your role as a diabetes educator and what you do when you teach patients. The title of my study is:
"An investigation into conceptions of teaching and learning in initial diabetes education."

The purpose of the study is to gain information about what Credentialled Diabetes Educators do when teaching blood glucose monitoring. If you are interested in participating, please read the attached information sheet and consent form and reply to Pauline.hill@unisa.edu.au via email before **24th October 2008.**

You will then be sent a series of two or three emails with 5-6 questions for you to answer via email. It will take about 15 minutes to complete and your participation is greatly appreciated.

You can choose a pseudonym to maintain your anonymity. All information will remain confidential and no information which could lead to the identification of individuals will be released.

If you have any questions or concerns about the research please contact me at pauline.hill@unisa.edu.au

Yours sincerely

Pauline Hill
Senior Lecturer
School of Nursing and Midwifery
University of South Australia
Ph 0411 441 092
Email pauline.hill@unisa.edu.au

Appendix 4: Pre-education session 1 CDE interview questions

Diabetes Nurse Educator Questions: Pre - Education Session

1. **What can you tell me about your role in relation to this patient you are about to see?**

Probing questions

Tell me more about being a …………

What did you mean by ………

Can you give me an example of what you do as a ………..

How does …… help the patient to learn?

Additional Questions if not describing role

Is there a name or label you would use to describe your role?
- a teacher?
- a nurse?
- a counsellor?

What does this mean to you?

In what way will you be a (teacher / nurse/ counsellor)?

Teaching
Educating
Telling
Giving information
Showing
Assessing pt readiness to learn
Demonstrating
Practice
Summarizing
Answering questions
Sequencing content
Formal teaching
Support
Counselling
Facilitate
Guidance

Diabetes Educator Questions Pre Education Session

2. **What can you tell me about the role of the person in this session today?**

Probing questions

Tell me more about being a …………

What did you mean by ………

Can you give me an example of how they are a ………..?

What do you want the person to do in this session?

Do you expect the person to do anything after the session?

Listening
Nodding
Understanding
Repeat information
Asking questions
Practice
Nurtured
Parented
Connect new knowledge to old

Additional Questions if not talking about patient role

Is there a name or label you would use to describe the person?
- a patient?
- a student?
- a learner?

What does this mean to you?

In what way will they be a (patient / student / learner)?

3. Can you tell me what you want to achieve in the education session you are about to do?

Probing questions

Tell me more about …………

What did you mean by ………

How do you think you might go about doing that?

Additional Questions about what they want to achieve in session

Do you have any specific plans for this session?

How do you think that will help the patient to learn?

Do you anticipate any difficulties?

What will you do about these difficulties?

What do you think the patient will find most difficult?

Self Management
Confidence
Competence
Understanding
Teach practical things
Log book
Quick reference guide
Handouts
Limited time
Don't overload with information
Add new information to past knowledge

End of interview.

Thank DNE for participation.

Remind them you will talk to them again after the session.

Appendix 5: Pre-education session 1 patient interview

Patient Questions – Pre-education Session

1. Can you tell me why you are here today?
2. What do you hope/expect to learn from your session today?
3. What do you already know about (insert topic)?
4. What do you need to do to help you to learn about your diabetes/topic?
5. What do you do if there is something you don't understand during the session / after a session?
6. Do you have anything you want to ask the DNE?
7. What do you remember from your last session?

New Questions

Can you tell me how you found out about your diabetes?
How did you find out about the DNE?
What can you tell me about the role of the DNE?
What can you tell me about your role?

Appendix 6: Post-education Session 1 Interview

Patient Questions – Post-education session

1. Can you tell me about what you learnt today?
2. How long do you think you will remember what you have learnt today?
3. Do you have another appointment – what is the purpose of that session?
4. How does today's session link up with what you have learnt in the past/expect to learn in the next session?
5. Is there anything you would like the DNE to do differently to help you learn?
6. How will you explain what you have learnt today to your wife/husband/partner etc when you get home?

Probe further on an element until no more new information is generated or patient indicates that he/she has nothing more to add.

Stop when ½ hour has elapsed.

Thank patient for participation. Ask whether patient would like to see a transcript of the interview.

☐ YES ☐ NO

If yes, ask how they would like to receive it and how long do they think they might need to check it and return it. Get patient's address …………………………………...
…………………………………………………………………………………………..

Keep interview consent form and write patient's name on tape.

Appendix 7: Pre-education Session 2 CDE interview

Second Interview for DNE

Diabetes Nurse Educator Questions: Pre - Education Session

1. **Can you tell me what you want to achieve in the education session you are about to do?**

Probing questions

Tell me more about …………

What did you mean by ………

How do you think you might go about doing that?

Do you have any specific plans for this session?

How do you think that will help the patient to learn?

Do you anticipate any difficulties?

What will you do about these difficulties?

What do you think the patient will find most difficult?

2. **What do you expect the patient to know/understand prior to this session?**

Probing questions

Tell me more about …………

What did you mean by ………

Can you give me an example of ………..

3. **What do you think the patient thinks this education session is about?**

End of interview. Thank DNE for participation. Remind them you will talk to them again after the session.

DNE Pre-Education Questions for Second Interview

Appendix 8: Pre-education Session 2 patient interview

Patient Questions – Pre-education Session

Session 2

1. Can you tell me why you are here today?

2. What do you already know about …………?

    a. How did you learn about ……..?

3. What do you think learning is?

    a. When you learn something, what do you do?

4. What do you think teaching is?

    a. When you teach something, what do you do?

5. What does the DNE do that is teaching?

Patient Questions Pre 2nd education session interview

6. What is the role of the DNE?

    a. When you have these meetings with the DNE what is she supposed to do?

7. What is your role?

    a. What are you supposed to do?

8. Do you have anything you want to ask the DNE?

9. What do you do if there is something you don't understand?

10. Can you tell me one (1) thing you remember from your last session?

    a. Why do you think you remember that?

Patient Questions Pre 2nd education session interview

Appendix 9: Ethics approval—Flinders University Social and Behavioural Ethics Committee

Flinders University and Southern Adelaide Health Service

SOCIAL AND BEHAVIOURAL RESEARCH ETHICS COMMITTEE

Room 105, Registry Building, Flinders University,
GPO Box 2100, ADELAIDE SA 5001
Phone: (08) 8201 5962
Email: sandy.huxtable@flinders.edu.au

MODIFICATION APPROVAL NOTICE

Principal Researcher: Pauline Hill

Address: 13 Flinders Parade
Flinders Park SA 5025

Project Title: An investigation into conceptions of teaching and learning in initial diabetes education

Project No.: **2695**

Approval Expiry Date: **30 March 2009**

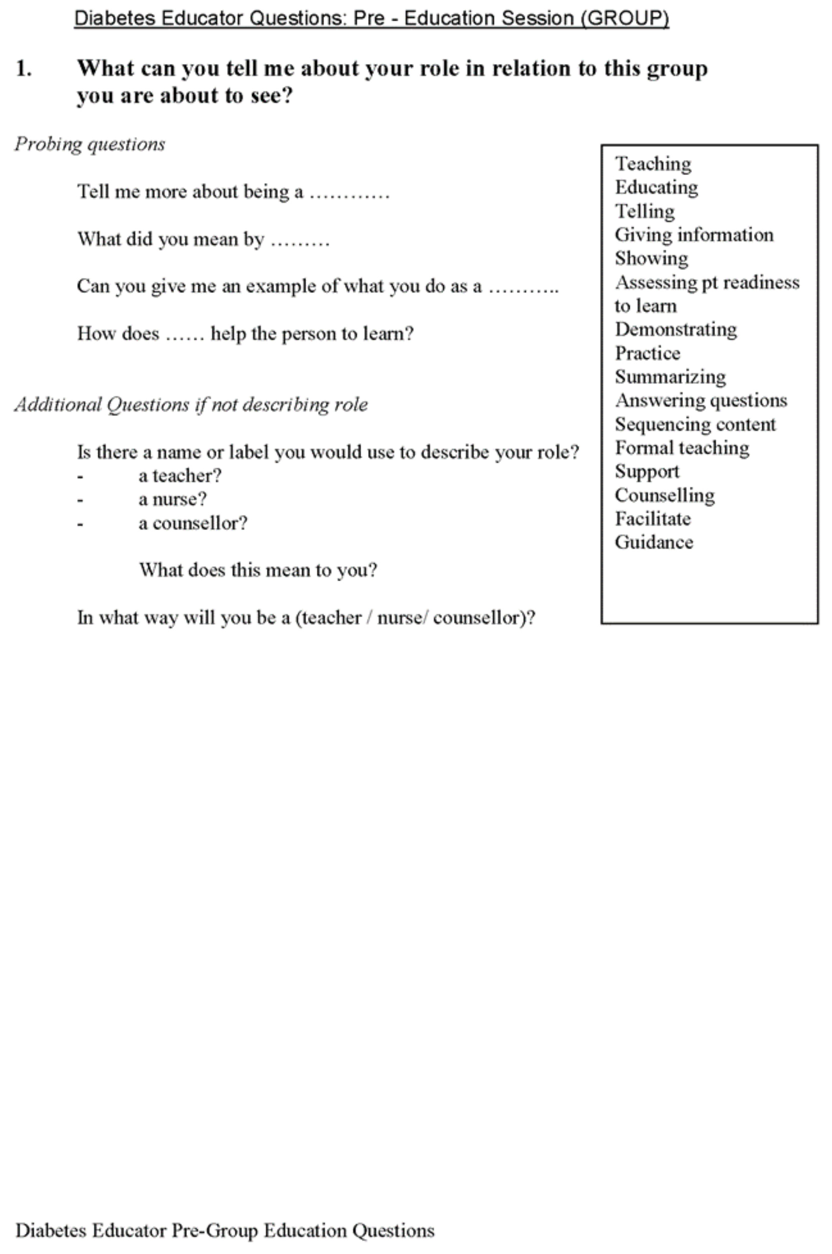
I refer to your application for a modification of the above project that has been approved previously.

I am pleased to inform you that the Chairperson has approved your request to amend the research project and associated participant documents, and for an extension of time until 30 March 2009.

Sandy Huxtable
Secretary
Social and Behavioural Research Ethics Committee
6 August 2008

cc: Prof Mike Lawson, School of Education

Appendix 10: Study 2 Group education session CDE interview



Diabetes Educator Questions: Pre - Education Session (GROUP)

1. What can you tell me about your role in relation to this group you are about to see?

Probing questions

Tell me more about being a …………

What did you mean by ………

Can you give me an example of what you do as a ………..

How does …… help the person to learn?

Additional Questions if not describing role

Is there a name or label you would use to describe your role?
- a teacher?
- a nurse?
- a counsellor?

What does this mean to you?

In what way will you be a (teacher / nurse/ counsellor)?

Teaching
Educating
Telling
Giving information
Showing
Assessing pt readiness to learn
Demonstrating
Practice
Summarizing
Answering questions
Sequencing content
Formal teaching
Support
Counselling
Facilitate
Guidance

Diabetes Educator Pre-Group Education Questions

2. What can you tell me about the role of the people attending this session today?

Probing questions

Tell me more about being a …………

What did you mean by ………

Can you give me an example of how they are a ………..?

What do you want the people to do in this session?

Do you expect the people to do anything after the session?

Additional Questions if not talking about persons role

Is there a name or label you would use to describe the people atte session?

- a patient?
- a student?
- a learner?

Listening
Nodding
Understanding
Repeat information
Asking questions
Practice
Nurtured
Parented
Connect new knowledge to old

What does this mean to you?

In what way will they be a (patient / student / learner)?

3. Can you tell me what you want to achieve in the education session you are about to do?

Probing questions

Tell me more about …………

What did you mean by ………

How do you think you might go about doing that?

Additional Questions about what they want to achieve in session

Do you have any specific plans for this session?

How do you think that will help the people to learn?

Do you anticipate any difficulties?

What will you do about these difficulties?

What do you think the people will find most difficult?

Self Management
Confidence
Competence
Understanding
Teach practical things
Log book
Quick reference guide
Handouts
Limited time
Don't overload with information
Add new information to past knowledge

4. What do you expect the people to know/understand prior to this session?

Probing questions

Tell me more about …………

What did you mean by ………

Can you give me an example of ………..

5. What do you expect the people to know/understand after this session?

Probing questions

Tell me more about …………

What did you mean by ………

Can you give me an example of ………..

Diabetes Educator Pre-Group Education Questions

Appendix 11: Study 2 Pre-group education session patient interview

Patient Questions – Pre-education Session (GROUP)

1. Can you tell me how you found out about your diabetes?

2. Have you met the Diabetes Educator before today?
    a. What do you know about the role of the Diabetes Educator?
    b. What do you think the DE is supposed to do in this session today?
    c. Have you been to any education sessions? If yes what?
    d. Have you had any individual sessions with the DE? If yes, what for?

3. What do think your role is in this session?
    a. What are you supposed to do?

4. What do you hope to learn today?
    a. What will you do to learn it?
    b. How will doing that help you to learn it?
    c. What should the DE do to help you learn?
    d. How will doing that help you to learn?

5. What do you already know about monitoring your blood glucose level?
    a. How did you learn about that?

6. What do you think learning is?
    a. When you learn something, what do you do?
    b. How does doing that help you to learn?
7. What do you think teaching is?
    a. When you teach something, what do you do?
    b. How do you think that helps others to learn?
8. Is the DE a teacher?
9. What does the DE do that is teaching?
    a. How does doing that help you to learn?
10. Do you have anything you want to ask the DE?
11. What do you do if there is something you don't understand?
12. Can you tell me one (1) thing you remember from your last session? (This may not be relevant if haven't had any prior sessions)
    a. Why do you think you remember that?

Appendix 12: Post-group education session patient interview

Patient Questions – Post-education session (GROUP)

1. Can you tell me about what you learnt today?
2. What did you do to learn it?
    a. How did doing that help you to learn it?
3. Is there another thing that you did to help you learn today?
    a. How did doing that help you to learn it?
4. How long do you think you will remember what you have learnt today?
5. What did the DE do to help you to learn?
    a. How did doing that help you to learn?
6. Is there anything else the DE did to help you to learn?
    a. How did doing that help you to learn?
7. Is there anything you would like the DE to do differently to help you learn?
    a. How would doing that help you to learn?

8. How does today's session link up with what you have learned in the past/expect to learn in the next session?

9. How will you explain what you have learned today to your wife/husband/ partner etc when you get home?

10. Do you have another appointment – what is the purpose of that session?

Probe further on an element until no more new information is generated or patient indicates that he/she has nothing more to add.

Thank the person for their participation. Ask if they would like to see a transcript of the interview.

☐ YES ☐ NO

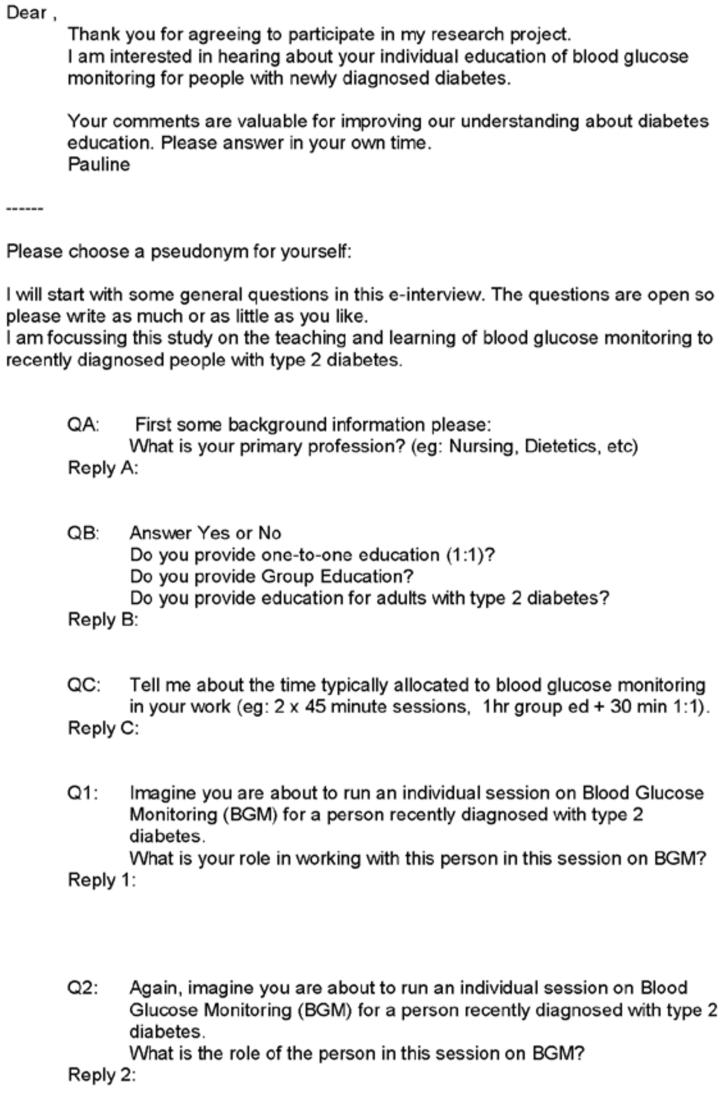
If yes, ask how they would like to receive it and how long do they think they might need to check it and return it. Get patient's address

………………………………………..…………………………………………

…………………………………………………………………….……………..

Keep interview consent form and write patient's name on tape.

Appendix 13: First Series of Email Questions



Dear ,

Thank you for agreeing to participate in my research project.
I am interested in hearing about your individual education of blood glucose monitoring for people with newly diagnosed diabetes.

Your comments are valuable for improving our understanding about diabetes education. Please answer in your own time.
Pauline

Please choose a pseudonym for yourself:

I will start with some general questions in this e-interview. The questions are open so please write as much or as little as you like.
I am focussing this study on the teaching and learning of blood glucose monitoring to recently diagnosed people with type 2 diabetes.

QA: First some background information please:
What is your primary profession? (eg: Nursing, Dietetics, etc)
Reply A:

QB: Answer Yes or No
Do you provide one-to-one education (1:1)?
Do you provide Group Education?
Do you provide education for adults with type 2 diabetes?
Reply B:

QC: Tell me about the time typically allocated to blood glucose monitoring in your work (eg: 2 x 45 minute sessions, 1hr group ed + 30 min 1:1).
Reply C:

Q1: Imagine you are about to run an individual session on Blood Glucose Monitoring (BGM) for a person recently diagnosed with type 2 diabetes.
What is your role in working with this person in this session on BGM?
Reply 1:

Q2: Again, imagine you are about to run an individual session on Blood Glucose Monitoring (BGM) for a person recently diagnosed with type 2 diabetes.
What is the role of the person in this session on BGM?
Reply 2:

Q3: When running an individual session on Blood Glucose Monitoring (BGM) for a recently diagnosed person with type 2 diabetes : Tell me how you will teach the person about BGM.

Reply 3:

Q4. Tell me how the person with Type 2 diabetes will learn about BGM?

Reply 4:

Q5: What are the most important things you will do as a diabetes educator to help this person learn effectively in this session?

Reply 5:

Q6: What are the most important things the person must do in this session to learn effectively ?

Reply 6:

Pauline Hill
Senior Lecturer
University of SA

Appendix 14: Second Series of Email Questions

CDE Questions Part 2 via Email

1. When I asked you to tell me about your role in the session on BGM for a person with type 2 diabetes you mentioned …….
    1.1. Can you tell more about ……..

2. In the first email I asked you to tell me about the person's role in this session on Blood Glucose Monitoring (BGM). You mentioned ………
    2.1. Can you tell me more about ……………..

3. You also mentioned that you will do ……….. to teach the person about BGM.
    3.1. Can you tell me how this will help the person to learn about BGM?

4. You also mentioned that the person will ……….. to help learn about BGM.
    4.1. Can you tell me more about how this will help the person to learn about BGM?

5. You also mentioned that the most important thing you will do is ………..
    5.1. Can you tell me how this will help the person to learn about BGM?

6. You also mentioned that the most important thing the person will do is ………..
    6.1. Can you tell me how this will help the patient to learn about BGM?

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