FEASIBILITY OF INTERACTIVE DIABETES WORKSHOPS FOR PRIMARY HEALTH CARE NURSES IN A FREE-STATE SUB-DISTRICT

By

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in the Faculty of Health Sciences at the University of the Free State

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DECLARATION

I, Eva Mukurunge, declare that the Master's degree research dissertation that I herewith submit for the Master's degree qualification, Master of Nursing, at the School of Nursing in the Faculty of Health Sciences at the University of the Free State, is my independent work, and that I have not previously submitted it for a qualification at another institution of higher education.

_____ _____

Eva Mukurunge Date

DEDICATION

In loving memory of my mother, Thandiwe Chikumbirike. This is for you, Mother.

ACKNOWLEDGEMENTS

I would like to express my gratitude to all mentioned, without whose assistance this study would not have been a success.

- The Most High God, for health, courage and perseverance to complete this study.
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- Ms H. Human, for the language and technical editing of the report.

CONCEPTUAL AND OPERATIONAL DEFINITIONS

Feasibility: Feasibility refers to the extent to which a smaller version of the main study can be implemented with confidence, showing that the intervention being tested can be safely and successfully implemented (Lancaster, 2015: 2). In this study, feasibility is associated with the study's four objectives as set out in this document, and relates to the ease of developing the interactive workshop programme, the ease of conducting the interactive workshops for primary health care nurses in a Free State sub-district, and a change in diabetes-related knowledge as indicated by the pre- and posttests. Feasibility will also refer to the ease with which the pretest, posttest and Likert scale can be used in the collection of data.

Health professionals: According to the World Health Organization (WHO, 2018a: online), a health professional is an individual who is associated with a discipline, who is qualified and allowed by a regulatory body to provide essential services that promote health, prevent diseases and deliver health care services to individuals, families and communities based on a primary health care approach. In this study, a health professional will refer to a person who is training (student/learner) or has gone through a training programme to provide health care services in any one of the health professions.

Interactive workshops: According to Pavelin, Pundir and Cham (2014: online), interactive workshops are a structured set of activities that are facilitated to groups of participants in one location, of which the aim is to explore a problem and its solutions over a specific period. In this study, interactive workshops will refer to structured activities (skills) with nurses who care for patients diagnosed with diabetes in primary health care clinics in Botshabelo and Thaba Nchu. The activities of the workshop will focus on creating solutions for previously identified gaps in diabetes-related knowledge, attitudes and practice of these nurses. The researcher will facilitate the workshops over a fixed period.

Nurses: According to South Africa's Nursing Act No. 33 of 2005 (Republic of South Africa, 2006: 25) the scope of nurses' work includes the assumption of full responsibility and accountability to provide nursing care to people in all health settings, to individuals, groups and communities. There are different categories of nurses registered with South African Nursing Council, namely, professional nurse, midwife, staff nurse, enrolled nurse, enrolled midwife, auxiliary nurse and auxiliary midwife (Republic of South Africa, 2006: 25). In this study, reference to nurse will include registered nurses, enrolled nurses and auxiliary nurses working in primary health care clinics in Botshabelo and Thaba Nchu.

Primary health care: Primary health care is an approach to medical care that focusses on provision of essential health care to meet the health needs of people in societies across the life continuum. The focus of primary health care is empowerment of individuals and communities to take charge of their own health through a multisectoral approach (WHO, 2019: online). In this study, primary health care will refer to the nursing care that is provided to patients living with diabetes in order to prevent complications and maintain normal, constant glucose levels.

LIST OF ABBREVIATIONS AND ACRONYMS

BMI	Body mass index
CCMDD	Central Chronic Medicines Dispensing and Distribution
DoH	Department of Health
HSREC	Health Sciences Research Ethics Committee
IDF	International Diabetic Federation
KAP	Knowledge, attitudes and practices
NDoH	National Department of Health
NHI	National Health Insurance
PHC	Primary health care
PICO	Population, intervention, control, outcome
SANC	South African Nursing Council
UFS	University of the Free State
WHO	World Health Organization

ABSTRACT

The health care system of South Africa is driven by the primary health care (PHC) system approach, of which nurses are the backbone of health care service provision. The aim of the PHC approach is to ensure universal accessibility of health care services in an environment characterised by an ever-increasing prevalence of non-communicable diseases, including diabetes. Research has revealed that, in a Free State sub-district, PHC nurses have decreased levels of motivation for and limited knowledge of the management of diabetes.

This study forms part of a complex intervention research programme that followed a phased approach, which allowed researchers to assess the feasibility of a health dialogue model that had been designed in previous research. The aim of this study was to establish the feasibility of interactive diabetes workshops for PHC nurses in a Free State sub-district. In order to ensure achievement of the aim, four objectives were developed: a) development of an interactive workshop programme according to previously identified key diabetes-related messages; b) determination of diabetes-related knowledge by means of a pretest and posttest; c) facilitation of interactive diabetes workshops; and d) assessment of the feasibility of these workshops for PHC nurses post the interactive workshops.

An exploratory experimental pretest-posttest control group design was used in this study. A random sampling method was used to select 10 PHC clinics in a sub-district of the Free State, with five PHC clinics for each of the experimental (Thaba Nchu) and control (Botshabelo) sites. Each of the five PHC clinics in both the experimental and control groups were in a 15 km radius of each of Thaba Nchu and Botshabelo towns. A convenience sampling method was used at the 10 PHC clinics to select nurses. The sample size of the experimental and control groups was 21 nurses each.

Data used for the development of the interactive workshop programme was collected through a systematic search of literature using the first three steps of a systematic review process. Data of diabetes-related knowledge was collected using a pre/posttest

questionnaire. A five-point Likert scale was used for collection of data on assessment of the interactive diabetes workshops. Descriptive statistics were used for data analysis.

Results obtained from the systematic literature search revealed that, for workshops to be engaging, interactive activities should be used during facilitation. Interactive activities can include scenarios, small-group discussions, role playing, Kagan's rally coach, rally robin and timed pair share strategies. Statistically significant results from pre/post-testing in the experimental group indicated improved knowledge related to peripheral sensation (0.03) and depression (<0.01). Across the experimental and control groups, results for questions related to insulin use (0.04) and depression (0.001) were found to be statistically significant. In order for interactive workshops to be feasible, the participants and the facilitator should have consensus about time for facilitation.

Interactive workshops should be considered as a training platform for diabetes refresher training courses for nurses at PHC clinics. The content of the workshops should cover the key diabetes messages, and the facilitation should include interactive activities that are likely to enhance learning and participant engagement.

In conclusion, the researcher considers interactive diabetes workshops to be a feasible training platform for PHC nurses in a Free State sub-district. The training events could empower nurses with knowledge and skills, leading to improved health care services for diabetes patients.

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CHAPTER 1:
OVERVIEW OF THE STUDY

The most profound words will remain unread unless you can keep the learner engaged. You cannot see their eyes to know if they got it so … say it, show it, demo it and link it to an activity ~ James Bates.

1.1 INTRODUCTION TO THE STUDY

This study formed part of a complex intervention research study that followed a phased approach, which enabled researchers to assess the feasibility of a health dialogue model that had been designed in a previous research cycle. This study focused on Phase 3 of the complex intervention, that is, evaluating the feasibility of interactive workshops as training platforms for nurses who care for patients diagnosed with diabetes in a Free State sub-district, as shown in Figure 1.1.

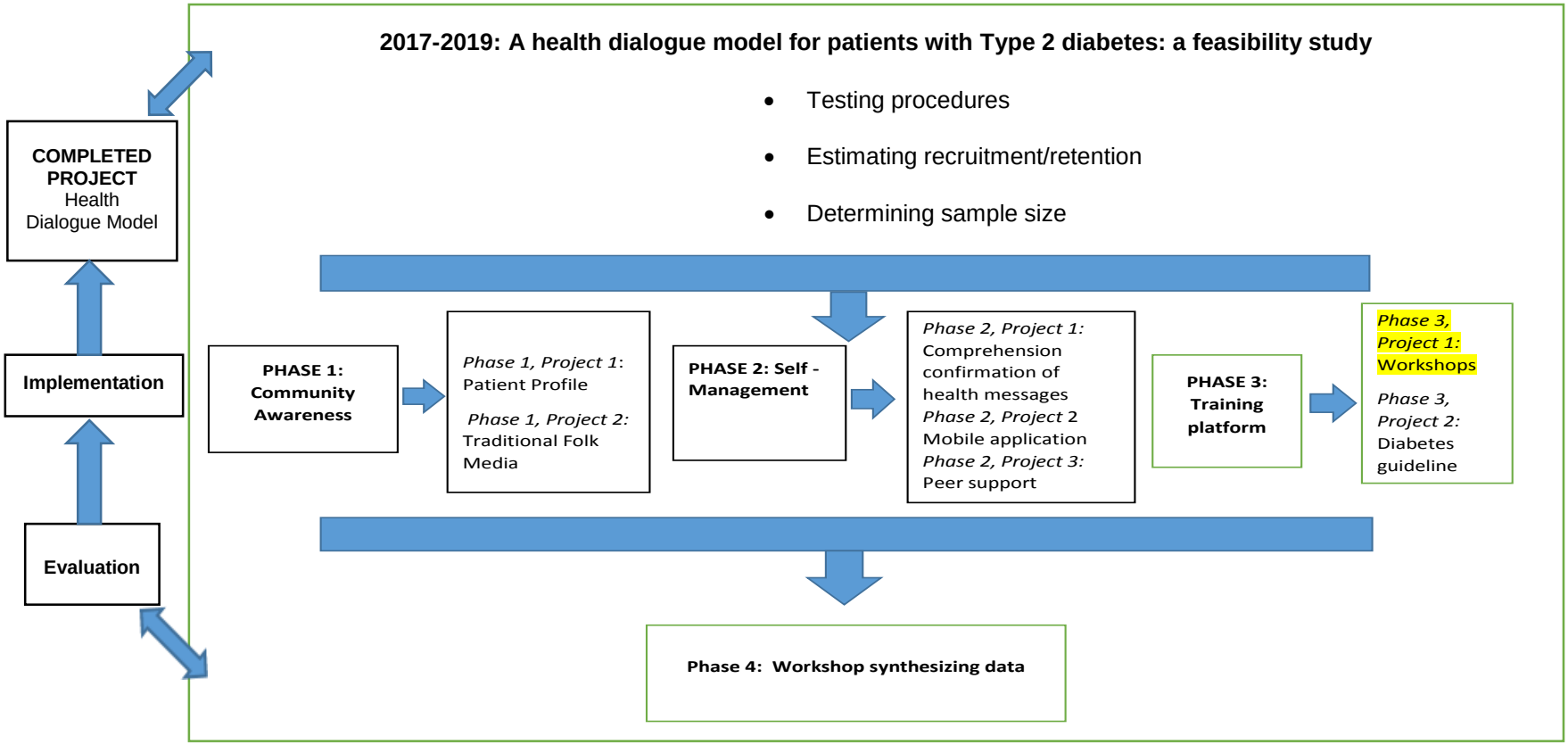

Figure 1.1: Positioning of protocol within a complex intervention research process

1.2 BACKGROUND TO THE STUDY

Research has found that there are methods of teaching that encourage maximum learning, participation and memory retention. According to Penjvini and Shahsawari (2013: 53), nurses who were trained using an interactive method, also known as a problem-solving method, had increased team working and communicating skills, and good self-evaluation, peer-evaluation, critical thinking and relationship skills, unlike those who were trained using the traditional lecture method. The traditional lecture method has been criticised for being teacher-centred and relatively ineffective (Marmah, 2014: 604). Its relative ineffectiveness compared to other, more active teaching methods relate to inadequacies in instilling affective and psychomotor skills in nursing students, and rendering learners passive during the teaching-learning process (Atanga, Abgor & Ayangwor, 2015: 1). Therefore, interactive workshops have become essential to ensure that students learn a skill, and acquire the knowledge and attitude that goes with it (Assodeh, Assodeh & Zarepour, 2012: 564).

According to the University of Kansas (2016: online), interactive workshops are a good method to enhance professional skills and learn about new developments in the field. Workshops provide a way to create an intensive educational experience in a short amount of time, when the time to present a more comprehensive effort may not be available. New concepts could be introduced in the workshop, which could prompt the participants to investigate further on their own. Workshops also allow the teaching of hands-on skills, thereby giving the participants a chance to try out new methods and fail in a safe situation. Failure is often the best teacher, and in this instance, does not carry consequences. At the same time, feedback, from both the presenter and peers in the group, help participants understand what they can do to avoid failure in a real situation. Workshops also enhance a sense of community purpose for people who work together (Pavelin, Pundir & Cham, 2014: online). As a result, interactive workshops are ideal for nursing, because they allow for the enhancement of skills by nurses within their scope of practice outside the real work

environment, without fear of harming the patient. The scope of practice of nurses outlines the procedures, processes and actions that they are allowed to undertake in their profession.

According to the International Council of Nurses (2013: online), the scope of nursing practice embraces the autonomous and collaborative care of individuals of all ages, families, groups and communities, sick or well and in all settings, in an endeavour to promote health, prevent illness, and care for ill, disabled and dying people. The scope includes, furthermore, leadership, management, development of health policies for health care systems and development of new knowledge through research. This diverse scope of practice of nurses allows them to render comprehensive care to patients in primary health care facilities in all countries.

According to the World Health Organization (WHO) (1978: online), in the Declaration of Alma-Ata, primary health care (PHC) refers to the health care where patients get assistance at the local health clinic before being referred to hospitals for further management. The practice is embedded in principles and standards of global health provision and should be available to every patient. The emphasis of PHC is on community engagement and autonomy, with minimal costs to the community and the entire country.

PHC is the first level of contact of individuals, families and the community with the national health system, thereby bringing health care as close to where people live and work as possible (Erny-Albrecht, Bywood & Oliver-Baxter, 2015: 10). PHC facilities are settings where outpatients receive medical treatment, medical follow-ups after discharge from hospitals, health screening and education, immunisations and diagnostic and pharmaceutical services (Visagie & Schneider, 2014: 3). PHC forms an integral part of the health care system of many countries, including South Africa.

The South African government has taken great strides in making health care accessible to its populace, by establishing PHC facilities at community level (Maillacheruvu & McDuff, 2014: 8). However, the health care system faces challenges in districts, due to

rural-to-urban migration of nurses, unequal distribution of health care personnel in the public and private sectors, low levels of skills of professionals, low staff motivation and lack of managerial capacity (Dookie & Singh, 2012: 45). The national Department of Health (NDoH) (2018: 8) states that nurses are the backbone of the health care system. However, the WHO (2015: 120) states that the ratio of nurses to patients in South Africa is 51 nurses for every 10 000 patients. The ratio is lower than the ratio recommended by the WHO, which advises that, for countries to achieve the Sustainable Development Goals, they should have a minimum of 5.9 nurses per 1 000 people (Cometto, Scheffler, Bruckner, Liu, Maeda, Tomblin-Murphy, Hunter & Campbell, 2016: 11). This seemingly small number of nurses has to deal with the ever-increasing prevalence of non-communicable diseases, which include diabetes (Maimela, Alberts, Modjadji, Choma, Dikotope, Ntuli, Van Geertruyden, 2016: 34).

Diabetes mellitus is a chronic, non-communicable lifestyle disease, of which the prevalence has escalated globally over the years. According to the International Diabetes Federation (IDF) (2017: online) there is an estimated 451 million cases of diabetes worldwide, and 2.28 million cases in South Africa. The prevalence of diabetes has constantly increased over the past three decades, with the most rapid growth occurring in low- and middle-income countries, such as South Africa (WHO, 2016: 21). An increase in urbanisation and unhealthy lifestyles are some of the contributing factors in the ever-increasing diabetes prevalence in South Africa (Erny-Albrecht *et al*. 2015: 5). Most South African diabetes patients access their health care services at public health care centres at district level (Maillacheruvu & McDuff, 2014: 7).

1.3 PROBLEM STATEMENT

Nurses manage most of the PHC clinics in South Africa (Murphy, Chuma, Mathews, Steyn & Levitt, 2015: 303; NDoH, 2018: 8). The nurses are overwhelmed with work, because of a shortage of nurses at the primary health care clinics. Low levels of skills and motivation have been reported for some of these nurses (Awases, Bezuidenhout & Roos, 2013). The

motivation of PHC nurses is important, since low levels of motivation could have a negative effect on the achievement of high standards in health service delivery (Jooste & Hamani, 2016: 44). Findings of research that was conducted in the development phase of the Complex Intervention (Figure 1.1), reveals that nurses in Thaba Nchu and Botshabelo, which fall in a sub-district of the Free State province, had limited skills on diabetes management, and decreased levels of motivation (Reid, Walsh, Raubenheimer, Bradshaw, Pienaar, Hassan, Nyoni & Le Roux, 2018: 125).

Other research identified six key diabetes messages as the fundamental issues to be addressed (Nyoni & Reid, 2019: 3; Reid *et al.* 2018: 128). The six key diabetes messages will be discussed in detail in Chapter 2.

Research has provided evidence that the diabetes management skills of nurses working in PHC clinics in Thaba Nchu and Botshabelo should be improved (Reid *et al*. 2018: 127). Concurrently, in this district, specific, key diabetic messages that need to be addressed have been identified in nurses and patients alike. Despite nurses in all provinces of South Africa being trained to use an integrated tool for the management of chronic diseases, nurses in the Free State faced challenges in the management of diabetes (Fairall, Folb, Timmerman, Lombard, Steyn, Bachmann & Bateman, 2016: 5). In addition, the data obtained from studies during the development phase of the Health Dialogue Model for patients with Type 2 diabetes strongly suggests that interactive diabetes workshops would be the best training platform to explore for nurses. There is no evidence that PHC nurses in the Free State province had been trained on diabetes using interactive workshops. Interactive workshops have been used successfully in other countries for the improvement of nurses' diabetes management skills (Duet Diabetes, 2018: online).

1.4 RESEARCH QUESTION

Are interactive diabetes workshops feasible as a method of teaching for primary health care nurses in a Free State sub-district?

1.5 OBJECTIVES

To describe the feasibility of interactive diabetes workshops for primary health care nurses in a Free State sub-district, the objectives of the study were:

1) To develop an interactive workshop programme according to previously identified, key diabetes-related messages using a literature search;
2) To determine diabetes-related knowledge by means of a pretest diabetes questionnaire;
3) To facilitate interactive workshops and assess the feasibility of interactive diabetes workshops for primary health care nurses post the interactive workshops, by means of a Likert scale; and
4) To determine nurses' diabetes-related knowledge by means of a posttest diabetes questionnaire.

1.6 CONCEPTUAL FRAMEWORK

A conceptual framework is made up of a group of concepts that explain how the research problem would be solved systematically (Adom, Hussein & Agyem, 2018: 439). Figure 1.2 is an illustration of the conceptual framework of the study. The figure depicts how the researcher intended to integrate and interpret the information exposed by the study.

The conceptual framework shows that learning theories or principles were paramount in this study. The four guiding learning principles were the principle of constructivism, constructive alignment, scaffolding and authenticity. The principle of constructivism states that learning is an active, contextualised process of constructing knowledge, rather than acquiring it (Suhendi & Purwarno, 2018: 88). The principle of constructive alignment is a concept that is used to devise learning activities that address the intended learning outcomes directly (McLeod, 2018: online). The principle of scaffolding states that the expert offers support to the learners in order to enhance learning and aid in the mastery

of tasks. During this process, the expert systematically builds on the learners' experiences and knowledge as they learn new skills. However, the support is gradually removed as the learners master the assigned tasks (Toledo & Dubas, 2016: 66). The principle of authenticity states that learning is designed to connect what the learners are taught in class to real-world issues, problems, and applications, and that learning experiences should reflect the complexities and ambiguities of real life (Roach, Tilley & Mitchell, 2018: 497).

As shown in Figure 1.2, the diabetes-related knowledge of participants was assessed before they could attend the interactive diabetes workshops. During the workshops, participants were engaged in various learning activities. At the end of the workshops, their diabetes-related knowledge was reassessed using the same tool as before. The participants also evaluated the workshops. Figure 1.2 depicts how the whole study was integrated.

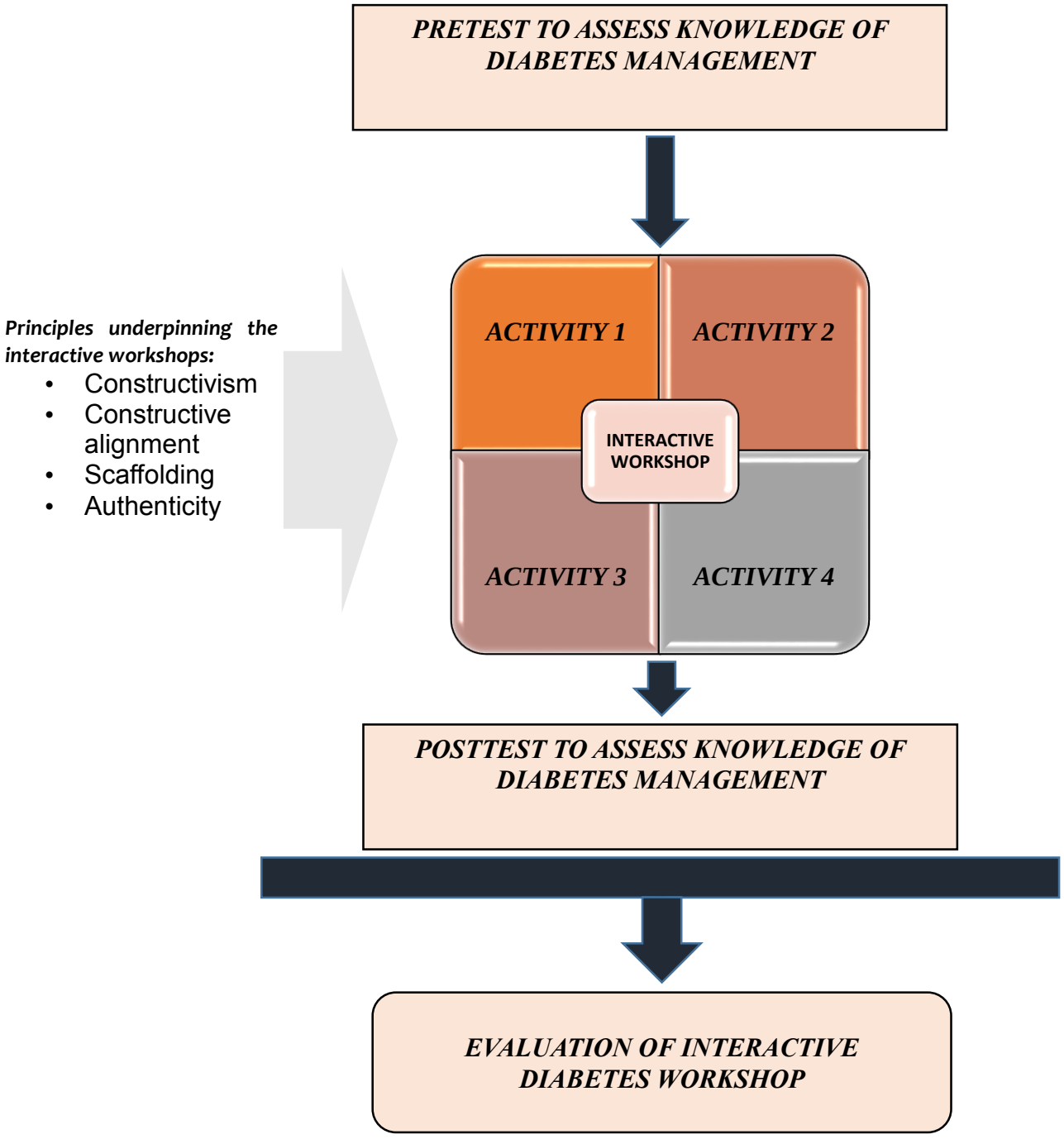

Figure 1.2: Conceptual framework of the study

1.7 PROPOSED STAGES OF THE STUDY

Figure 1.3 depicts the various stages of the study.

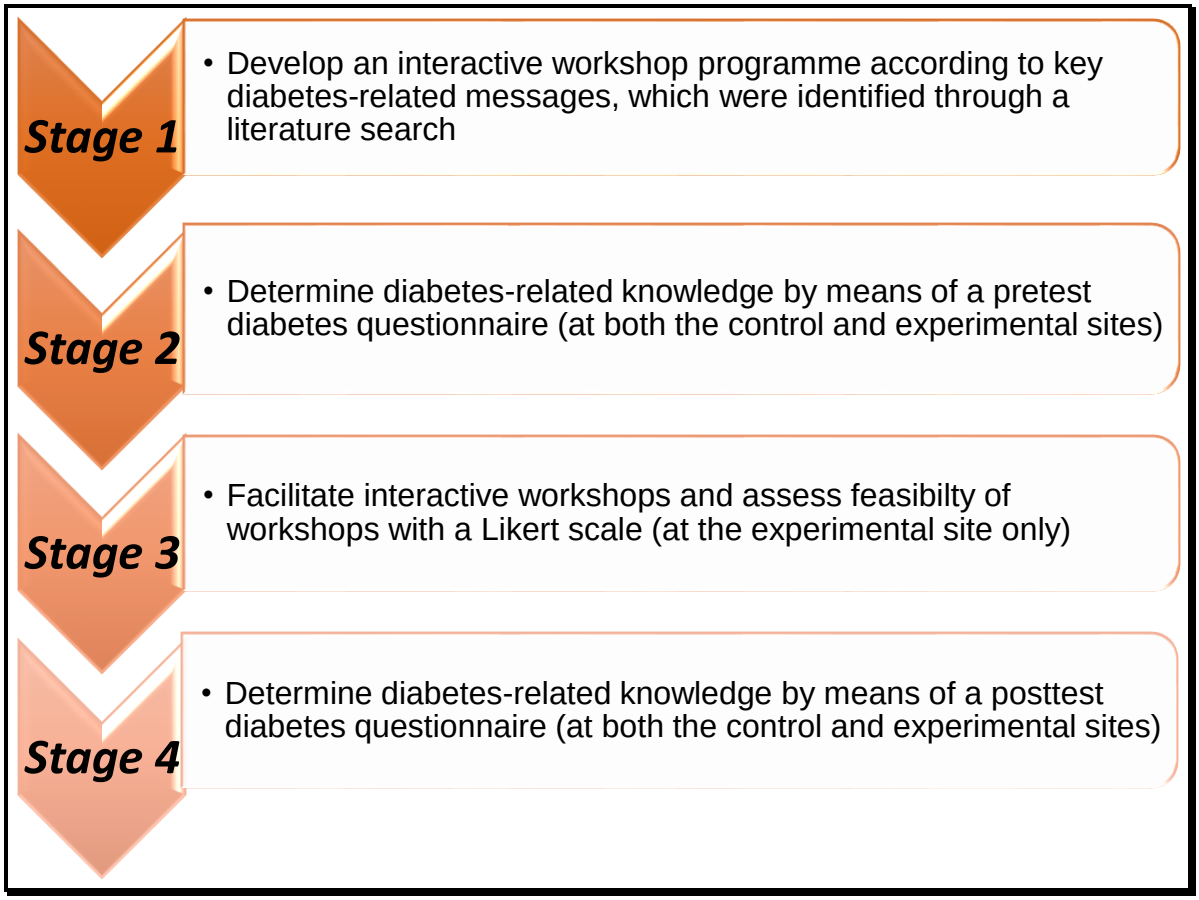

Figure 1.3: Different stages of the study

1.8 RESEARCH DESIGN

Research design refers to the overall logical process of obtaining answers to the research question. The design focusses on the product, with all the steps in the process to obtain the expected outcome (De Vos, Strydom, Fouché & Delport, 2011: 109). The study utilised an exploratory experimental pretest-posttest control group design, as it aimed to

assess the feasibility of interactive diabetes workshops for PHC nurses in a Free State sub-district. Details about this design will be presented in Chapter 3.

1.8.1 Stage 1: Development of an interactive workshop programme

Developing a programme for the interactive workshops was guided by literature from a systematic literature search. The interactive workshops had to cover information concerning the six key diabetes messages. Details of the development will be provided in Chapter 3.

1.8.2 Stages 2 and 4: Pre- and posttesting of diabetes-related knowledge

In Stages 2 and 4, diabetes-related knowledge of PHC nurses was tested pre and post the interactive diabetes workshops.

- Research technique: The research technique that was used to determine diabetes-related knowledge is a questionnaire. More detail on the research technique will be given in Chapter 3.
- Population and sampling: The population for Stages 2 and 4 was all the nurses at the 13 PHC clinics in Botshabelo (control site) and five PHC clinics in Thaba Nchu (experimental site). Random sampling was used to select five PHC clinics that are in a 15 km radius of Botshabelo town and five clinics in a 15 km radius of Thaba Nchu town. Convenience sampling was then done to select the sample of 21 participants in the experimental group and 21 participants in the control group. Details of the population and sampling will be provided in Chapter 3.
- Pilot study: A pilot study was carried out of the pre/posttest questionnaire and the interactive diabetes programme. Details of the pilot study will be provided in Chapter 3.

1.8.3 Stage 3: Facilitation of interactive diabetes workshops and assessing the feasibility of interactive diabetes workshops for primary health care nurses post the interactive workshops

The interactive diabetes workshops were facilitated only at the experimental sites in Thaba Nchu.

- Population and sampling: The population and sampling for this stage was the same as described in 1.8.2.
- Pilot study: The pilot study for Stage 3 was conducted at a PHC clinic in Botshabelo. Details of the pilot study will be provided in Chapter 3.
- Implementation of the interactive diabetes workshops: The interactive diabetes workshops were facilitated at five PHC clinics in Thaba Nchu. Details of the implementation of these workshops will be given in Chapter 3.

1.8.4 Data collection in Stages 1-4

A systematic search of literature was used as a method of data collection for Stage 1. The literature was used to develop the interactive diabetes workshop programme. Pre- and posttest questionnaires (Addendum G) were used to collect data in Stages 2 and 4 respectively. Data from Stage 3 was collected using a Likert scale (Addendum H). Figure 1.4 shows the data collection process.

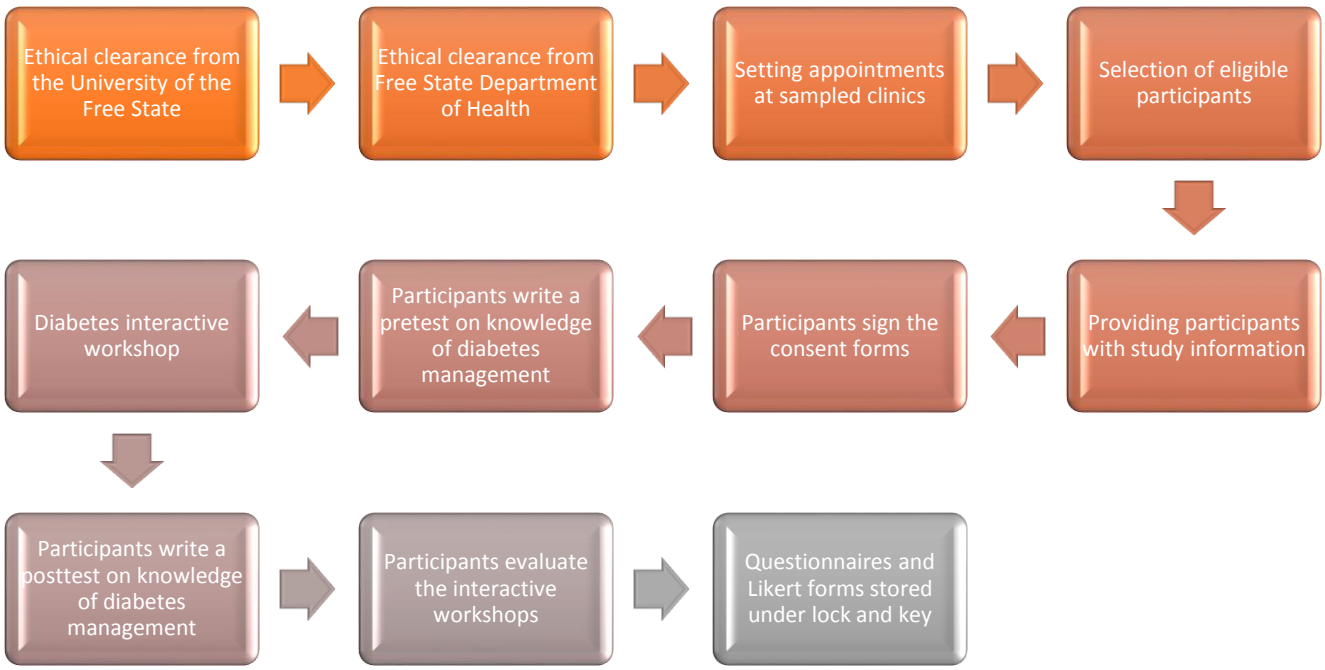

Figure 1.4: Data collection process of the study

1.8.5 Rigor in Stages 1-4

Due to the differences between the four stages of this study, different criteria were used to ensure rigor during these stages. In Stage 1, four criteria, namely, truth value, consistency, neutrality and applicability, were used to ensure rigor. In Stages, 2, 3 and 4, validity and reliability were enhanced – details will be given in Chapter 3.

1.8.6 Ethical considerations in Stages 1-4

In Stage 1 ethical considerations were guided by the four principles of research integrity of the Singapore Statement (World Conferences on Research Integrity, 2010: online). Details will be provided in Chapter 3. In Stages 2, 3 and 4, the principles depicted in the

Belmont Report guided the ethical principles (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1978: 4-8). Details will be given in Chapter 3.

1.8.7 Data analysis in Stages 1-4

Data analysis was done by the researcher with the help of a biostatistician of the Department of Biostatistics, School of Basic Medical Sciences, Faculty of Health Sciences at the University of the Free State (UFS). Details of the analysis will be provided in Chapter 4.

1.9 CONCLUSION

Chapter 1 provided a brief overview of the study. In this overview, the problem statement, aim and objectives emphasised why the study was done, while the conceptual framework, research design and technique elaborated on how this study was undertaken. Furthermore, sections on the population, sample, pilot study and data collection itself indicated who took part and who conducted the study, to ensure accuracy of results and universal respect for the study participants. Validity, reliability and ethical considerations were briefly mentioned at the end of the chapter.

Chapter 2 will provide a detailed discussion of the literature on global, national and local knowledge of nurses on the management of diabetes according to the six key diabetes messages, and interactive workshops. Chapter 3 will give a detailed discussion of the methodology of the study. The results of the study will be depicted in Chapter 4, which will lead to Chapter 5, which will give a summary of the whole study and recommendations related to the research.

CHAPTER 2:
REVIEW OF THE LITERATURE

2.1 INTRODUCTION

An overview of the study was outlined in Chapter 1. This chapter will provide a review of the literature for a number of concepts. Among the concepts that will be investigated in this chapter through a review of literature is diabetes mellitus – one of the most prevalent non-communicable diseases in South Africa. The types of diabetes mellitus and six key diabetes messages, as recommended by previous research, will be reviewed. A review of the management of diabetes within the South African context, in conjunction with details of the way the South African PHC system expects diabetes to be managed, will be presented. Interactive workshops will be discussed, as a platform for knowledge transfer of the key diabetes messages to PHC nurses. A review of literature on the framework that was used to develop a successful interactive workshop will be presented, together with the four principles that underpin interactive workshops, namely, constructivism, constructive alignment, scaffolding and authenticity. The advantages and disadvantages of the principles will also be included. A review of the evaluation methods that were used to establish the effectiveness of interactive workshops will be presented.

2.2 SUMMARISED OVERVIEW OF DIABETES IN SOUTH AFRICA

Diabetes mellitus is a metabolic disorder that is characterised by chronic states of hyperglycaemia, which results from partial or complete failure of the pancreas to secrete insulin, defects in insulin function, or a combination of both phenomena (Morgan, Deoraj, Felty, Yoo & Roy, 2016: 1; WHO, 2018b: online). There are different types of diabetes, and Type 2 diabetes mellitus accounts for 90-95% of all the diabetes cases worldwide (American Diabetes Association, 2018: S19).

In South Africa, Type 2 diabetes mellitus has become the leading cause of morbidity and mortality (Pheiffer, Pillay-Van Wyk, Joubert, Levitt, Nglazi & Bradshaw, 2018: 1). The

prevalence of Type 2 diabetes mellitus in South Africa is attributed to the prevailing sedentary lifestyle and urbanisation, which is linked to changes in nutrition, and obesity (Pheiffer *et al.* 2018:2). In addition to diabetes mellitus, the South African health delivery system is faced with a quadruple burden of disease, including non-communicable diseases (Nojilana, Bradshaw, Pillay-Van Wyk, Msemburi, Somdyala, Joubert, Groenewald, Laubscher & Dorrington, 2016: 436-437). As a measure to deal with the burden of disease, the South African government adopted the PHC approach, to ensure that its populace can access health care services (Gray & Vawda, 2017: 2).

The delivery of health care in South Africa follows a district health system, which is underpinned by the PHC approach that was adopted at Alma Ata in 1978. PHC clinics are the first level of contact between the community and the national health system (WHO, 1978: 16-18). PHC refers to the health care that patients receive at the local health clinic before being referred to hospitals for further management. The practice is embedded in principles and standards of global health provision and should be available to every patient. The emphasis of PHC is on community engagement and autonomy, with minimal costs to the community and the entire country (WHO, 1978: 8). PHC nurses are providers of first contact health care with patients and are essential for the provision of advice on health promotion and protection (Hlongwana, Bezuidenhout & Helberg, 2015: 330; Nora, Schaefer & Neves-Amado, 2018: 521).

Nurses are the backbone of the PHC approach. Therefore, if this system is to work, there is a need for highly competent nurses to manage patients (NDoH, 2018: 19; Tshililo, Mangena-Netshikweta, Nemathaga & Maluleke, 2019: 2). Type 2 diabetes is one of the most prevalent chronic, non-communicable diseases that PHC nurses have to deal with - and diabetes prevalence is escalating. Diabetes patients need to be equipped with appropriate knowledge for self-management of diabetes. Nurses, therefore, have to be highly competent, so that they can empower patients with skills to self-manage their disease and prevent complications, as far as possible (Gorina, Limonero & Alvarez, 2018: 140; Paraizo, Isidaro, Terra, Dazio, Felipe & Fava, 2018: 180).

In order to meet the demand for care for patients with diabetes, the government of South Africa has proposed strategies to improve the quality of nursing care provided at all PHC clinics. The NDoH (2018:13) has a strategy to increase the number of graduating health care professionals who were trained with a curriculum in which the PHC philosophy is embedded. According to the NDoH (2018: 11), measures are being planned to ensure that, by the year 2020, all unregistered institutions that train nurses will be eliminated. New curricula, which will lead to improvement of clinical training for all programmes, have been developed and submitted for accreditation. All these strategies are aimed at producing highly qualified nursing personnel, who will be competent to manage health care challenges at PHC clinics. Ultimately, the goal is to resolve the problems relating to distribution of health workers throughout the country, which is currently characterised by more health professionals at private and urban health care institutions (Igumbor, Davids, Nieuwoudt, Lee & Roomaney, 2016: 2; Van Rensburg, 2014: 5).

The NDoH has in place two main strategies to achieve maximum functionality of the PHC system. These strategies are the National Health Insurance (Department of Health, 2017: 3), and the Central Chronic Medicines Dispensing and Distribution (CCMDD) programme (NDoH, 2016: 1). The National Health Insurance is a government strategy to reduce the imbalance between the public and private health sectors, by offering financial support for the accessibility and reengineering strategy of the PHC system (Austin-Evelyn, Rabkin, Macheka, Mutiti, Mwansa-Kambafwile, Dlamini & El-Sadr, 2017: 2; Moosa, Derese & Peersmann, 2017: 2). The National Health Insurance was established to ensure universal health coverage for all South Africans, regardless of their socioeconomic status. The reengineering of the PHC system involves three main facets, which are municipal-based PHC outreach teams, school health teams, and the district-based clinical specialist team (Moosa *et al*. 2017: 2). Under the National Health Insurance strategy, there is a model of functional municipal-ward-based PHC outreach teams, which comprise teams of health care workers who play the role of linking communities to the PHC facilities (Moosa *et al.,* 2017: 2; NDoH, 2018: 11). Approximately 80% of the population of South Africa accesses

health care services through PHC facilities, which, together with the ever-growing disease burden, has constrained the supply of adequate medication to the populace (Tayob, Bezuidenhout & Helberg, 2014: 153). The CCMDD programme, together with a survaillance system, were, therefore, set up by the NDoH to ensure that all chronically ill patients have access to medication at PHC facilities (NDoH, 2018: 11) that are close to their residences.

The government has implemented strategies to increase and maintain the human resources that are employed at different health care facilities. There has been expansion of in-service training programmes for nurses in relevant areas of need and improvement of pre-training education, in order to ensure that a competent workforce manages the PHC facilities (NDoH, 2018: 56). The government is also increasing the number of PHC facilities and renovating existing ones, to ensure that everyone has access to health care. All the strategies mentioned are aimed at producing highly qualified nursing personnel who will be competent to manage health care problems at PHC clinics. PHC nurses should be competent enough to incorporate new, evidence-based treatment strategies to manage diabetes.

2.3 SIX KEY DIABETES MESSAGES

Six key diabetes messages were identified as messages that PHC nurses and the wider community need to be educated about to ensure that diabetes is curbed (Nyoni & Reid, 2019: 8; Reid *et al*. 2018: 128). These messages can be summarised as follows:

- Diabetes can be controlled and complications prevented.
- Diabetics should eat small, regular meals.
- Diabetics should aim to walk fast for at least 30 minutes most days.
- Medication must be taken as prescribed.
- Diabetics should lose weight as prescribed.
- Diabetics can enjoy a normal life.

2.3.1 Diabetes can be controlled and complications prevented

Patients who are diagnosed with diabetes may develop chronic complications that result in morbidity and mortality (Papatheodorou, Banach, Bekiari, Rizzo & Edmonds, 2018: 1). The complications of diabetes affect various organs, including eyes and feet, which could lead to blindness and limb amputations respectively (Lotfy, Adeghate, Kalasz, Singh & Adeghate, 2017: 7; Waheida, Elshemy & Basal, 2015: 67). A state of chronic, elevated blood glucose has several consequences, including damaging the microvasculature supplying the retina, which leads to bleeding, and oedema, which ultimately results in loss of vision (Sami, Ansari, Butt & Hamid, 2017: 65; WHO, 2017: 4). An effect of chronically elevated blood glucose levels is damage to neurones and blood vessels that supply the feet (Javed, Petropoulos, Alam & Malik, 2015: 15; WHO, 2017: 10; Zimmerman, 2016: online).

However, diabetes can be controlled and its complications prevented. Constant, strict monitoring of blood glucose levels is essential in the endeavour to prevent diabetes-related complications (Diabetes Canada Clinical Practice Guidelines Expert Committee, 2018: S210; IDF, 2019: online; International Council of Ophthalmology, 2017: 6). Scheduled, yearly eye check-ups are important for preventing retinopathy. In order to prevent limb amputations, patients with diabetes should be taught skills needed to do daily foot examinations, taught about the importance of annual foot examinations, and the necessity of wearing comfortable, cushion-soled shoes (American Diabetes Association, 2019: 30; Boulton, Amstrong, Kirsner, Attinger, Lavery, Lipsky, Mills & Steinberg, 2018: 5).

Therefore, there is a need for PHC nurses to have continual professional development opportunities, so that they can keep abreast with developments in prevention, control and prevention of diabetes-related complications.

2.3.2 Diabetics should eat small, regular meals

People with diabetes should aim to eat small, regular meals, to enhance maintenance of constant blood glucose levels (American Diabetes Association, 2019: 15; Sami *et al.,* 2017: 67; Subhashinie, Ekanayake & Wanigatunge, 2016: 4). Nutritionists recommend that people with Type 2 diabetes follow a diet low in saturated fats, with low glycaemic index carbohydrates and low sodium, and which is high in fibre, such as fruits and vegetables (Diabetes Australia, 2018: 9; Diabetes Canada Clinical Practice Guidelines Expert Committee, 2018: S67; Forouhi, Misra, Mohan, Taylor & Yancy, 2018: 2). This diet will enhance the maintenance of constant blood glucose levels.

For the nutritional management of diabetes, patients should regularly eat food that is affordable and available in their community. Therefore, nurses need to be knowledgeable about these foods, in order to advise patients accordingly (Udogadi, Onyenibe & Abdullahi, 2019: 30).

Nurses can suggest that people with diabetes eat dried fruits and nuts, which are known for their benefits for glucose and insulin metabolism (Hermandez-Alonso, Camacho-Barcia, Bullo & Salas-Salvado, 2017: 1; Viguiliouk, Jenkins, Mejia, Sievenpiper & Kendall, 2018: 2). Consuming starchy foods, such as maize and potatoes, that have been reheated, is beneficial. Cooling these foods leads to the formation of resistant starch, which has a low glycemic index. The resistant starch contains starch crystals that are resistant to digestive enzymes. Resistant starch improves the microbiota in the gastrointestinal tract and pathways linked to antidiabetic and anti-obesity medication (Yang, Darko, Huang, He, Yang, He, Li, Hocher & Yin, 2017: 315).

2.3.3 Diabetics should aim to walk fast for at least 30 minutes most days

Physical activity is essential in the management of Type 2 diabetes mellitus, because it facilitates energy use, hence, controls blood glucose levels (Colberg, Sigal, Yardley, Riddell, Dunstan, Dempey, Horton, Castorino & Tate, 2016: 2065). Physical exercise is

associated with improved muscle glucose uptake, which is maintained for up to two hours after cessation of the physical activity (Bird & Hawley, 2017: 3; Colberg *et al*. 2016: 2066; Teich & Riddell, 2016: 2999). Physical activity has the effect of increasing the number of insulin-signalling proteins in the muscles, hence, an increase in insulin sensitivity (Sami *et al*. 2017: 66). Therefore, people with Type 2 diabetes mellitus should aim to walk fast for at least 30 minutes most days, as doing so has benefits for the management of their condition (Balaji & Varne, 2017: 100; Mendes, Sousa, Almeida, Subtil, Guedes-Marques, Reis & Themudo-Barata, 2016: 2). However, physical activity can be associated with acute complications, such as hypoglycemia and cardiac events (Colberg *et al.* 2016: 2069). Diabetic patients need to be equipped with this knowledge, so that they can avoid occurrence of the acute complications of physical activity as far as possible.

PHC nurses are supposed to be able to demonstrate to their patients what brisk walking is. The nurses will only have the ability to demonstrate for their patients if they have been empowered with knowledge about exercise. Patients are often referred to other health professionals, such as physiotherapists, for advice about exercise. Diabetes patients in the South African context face challenges in accessing health services provided by allied health professionals, due to insufficient numbers of allied health professionals and the financial burden associated with specialised health care services from these professionals (Dizon, Grimmer, Machingaidze, McLaren & Louw, 2016: 2). These challenges, then, leave the nurse as the ultimate professional available to offer exercise lessons to people with diabetes (Chester, Stanley & Geetha, 2018: 643). Hence, there is a need for the PHC nurses to receive continuous professional development with regard to physical activity for people with diabetes.

2.3.4 Medication must be taken as prescribed

The importance of maintaining constant blood glucose levels by people with diabetes cannot be overemphasised, hence, they need to use medications when lifestyle changes fail to control blood glucose levels. The preferred first-line oral medication is metformin

(American Diabetes Association, 2018: 11; Marin-Penalver, Martin-Timon, Sevillano-Collantes & Canizo-Gomez, 2016: 359; Qaseem, Barry, Humphrey & Forciea, 2017: 280; Society for Endocrinology Metabolism and Diabetes of South Africa (SEMDSA) Type 2 Diabetes Guidelines Expert Committee, 2017: S39). However, precautions have to be taken to assess vitamin B12 periodically, since metformin use is associated with vitamin B12 deficiency.

If metformin together with lifestyle changes fail to control blood glucose levels, insulin has to be introduced to the treatment regimen (American Diabetes Association, 2018: 11; SEMDSA Type 2 Diabetes Guidelines Expert Committee, 2017: S39). Use of insulin should be coupled with comprehensive patient education, to enable correct self-administration of insulin. Administration of insulin into one area of the body is associated with lipodystrophy, which, in turn, is associated with poor insulin absorption and poor blood glucose control (Diabetes UK, 2019: online; Gentile, Strollo & Ceriello, 2016: 402).

If PHC nurses are to manage patients with Type 2 diabetes effectively, it is essential that they possess knowledge of medication. The shortage of doctors in PHC clinics requires nurses to prescribe and administer medications for patients. There is, therefore, a need for PHC nurses to have opportunties to refresh their knowledge of medication, so that they can be up-to-date with best practices (Eslamian, Moeini & Soleimani, 2015: 379).

2.3.5 Diabetics should lose weight as prescribed

Obesity is a risk factor that has great bearing on Type 2 diabetes. A state of obesity leads to insulin-receptor dysfunction, hence, insulin resistance and increased blood glucose levels (Siddiqui, 2018: 155). Therefore, to increase the sensitivity of cells to insulin, and to control blood glucose levels, there is a need for people with obesity and Type 2 diabetes to lose weight. A weight loss of 5% to 10% of the initial body weight is sufficient to improve insulin sensitivity and, ultimately, achieve glycaemic control (American Diabetes Association, 2018: 10; Wharton, Pedersen, Lau & Sharma, 2018: S124-S125). As a way of losing weight, people with Type 2 diabetes mellitus should regulate their

intake of food according to advice by nutritionists. Food that is low in saturated fats and sodium, food of low glyacemic index and food high in fibre have the benefit of reducing blood glucose levels and reducing body weight. There should be a balance between energy intake and physical exercise, so that blood glucose levels can be controlled (Diabetes Australia, 2018: 9; Diabetes Canada Clinical Practice Guidelines Expert Committee, 2018: S67; Forouhi *et al*. 2018: 2). In conjunction with weight loss, the waist circumference is important. Weight circumferences are associated with the risk of developing health problems, including diabetes. A waist circumference that is not associated with the risk of developing health problems is less than 102 cm in men, and a safe waist circumference for women is less than 88 cm. Values above the recommended values are associated with risks of developing health problems (American Diabetes Association, 2016: S48; Diabetes Australia, 2015: online; Wharton *et al.* 2018: S125). The body mass index (BMI) is a measure of body fat based on height and weight in adult men and women. The BMI is calculated as weight in kilograms divided by the square of height in meters (kg/m^2). The normal range for BMI is 18.5 to 24.9, into which people should aim to fall. The range 25.0 to 29.9 is associated with overweight while values above 30.0 indicate obesity (Mardolkar, 2017: 8; Nutall, 2015: 120).

PHC nurses need to have knowledge of the prescribed indicators of obesity and being overweight, including body mass index and waist circumference, so that they can give their patients appropriate health education. Note that PHC nurses do not deal with only Type 2 diabetes patients; they are expected to manage comprehensively a whole array of conditions that patients present with. Therefore, refresher learning and teaching opportunities should be provided for these nurses.

2.3.6 Diabetics can enjoy a normal life

Diabetes is closely associated with depression and, together, diabetes and depession cause mordity and mortality in more than 5% of the population of the world in any given year (Badescu, Tataru, Kobylinska, Georgescu, Zahiu, Zagrean & Zagrean, 2016: 120-

121; Naicker, Johnson, Skogen, Manuel, Overland, Sivertsen & Colman, 2017: 352). Management of diabetes places an overwhelming cognitive burden on the diabetic patient, resulting in depressive disorders (Naicker *et al*. 2017: 355). However, with enough support from family and health professionals, people with Type 2 diabetes can cope with the demands of managing diabetes (Bennich, Roder, Overgaard, Egerod, Munch, Knop, Vilsboll & Konradsen, 2017: 2; Kaira, Jena & Yeravdekar, 2018: 697; Knowles, Chew-Graham, Adeyemi, Coupe & Coventry, 2015: 2).

Nurses usually have inadequate intervention strategies for patients during the short and busy consultation sessions they have with patients (Bennich *et al*. 2016: 2). This means patients receive meagre information on how to cope with and manage their condition. Patients with Type 2 diabetes yearn for psychological support from nurses. However, the nurses are either overwhelmed with work, to the extent that they focus only on the aetiology, diagnosis and treatment of disease; or they do not have the capacity to offer psychological support. For these reasons, it is essential to offer learning and teaching opportunities to PHC nurses, to equip them with knowledge and skills on psychological support for patients with Type 2 diabetes.

PHC nurses have a mandate to provide patients with diabetes with comprehensive care and information on self-management of their condition. There is, therefore, a need for PHC nurses to be equipped with information about diabetes management through continuing professional development. The establishment of a platform through which this information can be transferred effectively is paramount. Knowledge can be transferred through various platforms, which include, but are not limited to, lectures, interactive workshops, seminars and conferences.

2.4 INTERACTIVE WORKSHOPS

An interactive workshop is a set of activities that is facilitated for groups of participants who work together to explore problems and their solutions, over a specific period, in one location (Pavelin *et al*. 2014: 1). Interactive workshops are a preferred platform for

delivery of on-the-job training for the following reasons: Interactive workshops provide a safe environment for participants who are health professionals to acquire new knowledge and skills, and to make mistakes without fear of jeopardising their profession (So, Chen, Wong & Chan, 2019: 42). Interactive workshops have been used for in-service training of different health professionals (Deeb, Johnson, Bondarew, Carrico, Laskin & Deeb, 2016: 94; Tryaki & Cinar, 2016: 163).

2.4.1 Framework of an interactive workshop

According to the University of Kansas (2018: online), an interactive workshop should have a framework that guides its operations. Furthermore, an interactive workshop should, generally, have a small number of participants, from a minimum of 6 to a maximum of 15. The small number will allow for one-on-one interactions and maximum participation. The facilitator of the interactive workshop should have real experience in the subject under discussion. Interactive workshops are usually designed for people who are in the same profession, or who work together. Facilitation of the interactive workshops is not limited to one person – there can be co-facilitation according to the preferences of the people involved. Interactive workshops are designed for teaching participants a number of concepts. These can be new ideas that they can implement in their work, or can involve the introduction of new practical skills or techniques, which they can incorporate in their work. It is mandatory for every participant in interactive workshops to participate. They have to practise the new skills and take part in the discussions of the new ideas being introduced in the workshop. Interactive workshops have a short time span, and they are usually limited to one session. The sessions can be as short as 90 minutes, to as long as three hours (Elliott, Creighton, Barker & Liao, 2016: 73). However, some interactive workshops can have multiple sessions over time, which can be a day, week or months. Methods of information delivery have to be interactive, for example, small-group discussions, quizzes, role playing, simulations and games can be used to stimulate every

participant to take part and learn in a more engaging, safe environment (Zaider, Banerjee, Manna, Coyle, Pehrson, Hammonds, Krueger & Bylund, 2016: 206).

2.4.2 Advantages of interactive workshops

There are *advantages* associated with using interactive workshops for continuous professional development. Interactive workshops offer a safe environment for participants. The safe environment of the workshop enables participants to obtain constructive feedback from their peers and the facilitator. Interactive workshops provide the chance for intense information dissemination to people in a short time. Interactive workshops enhance team spirit among participants who work together in the same workplace (McEwan, Ruissen, Eys, Zumbo & Beauchamp, 2017: 3).

There are some skills that might be absent in curricula for health professionals, which are nonetheless essential in the clinical area. Interactive workshops provide an opportunity for these skills to be taught to qualified health professionals, such as nurses, as part of in-service training (Habibzadeh, Aliha, Imanipour & Mehran, 2017: 79).

In addition, advantages of interactive workshops include improving learner performance in examinations, enhancing self confidence, and encouraging deep engagement with learning material (Deeb *et al*. 2016: 94; Nicholson, Reed & Chan, 2016: 9). Interactive workshops have the advantage of increasing retention and applicability of knowledge that has been acquired (Deeb *et al.* 2016: 94). Communication skills are key for all health professionals, including PHC nurses. Interactive workshops enhance communication skills among these health professionals (Pickles, Ivanusic, Xiao, Durward, Ryan & Hayes, 2018: 2).

2.4.3 Disadvantage of interactive workshops

The *disadvantage* of interactive workshops is that, if the knowledge gained during the workshop is not frequently reinforced by constant application, it decays. Therefore,

knowledge retention is poor if constant application of the acquired knowledge is lacking (Watkins, 2019: online). Limitations of interactive workshops that are delivered for in-service training include the unavailability of the participants. In a study in Turkey, where interactive workshops were used to train nurses on how to manage continuous positive airway pressure in newborns, participants could not attend the interactive workshops, since most of them were engaged on the day that was scheduled for the interactive workshop (Tryaki & Cinar, 2016: 163).

2.4.4 Three phases of interactive workshops

In order to have successful workshops, the workshops have to follow a *process*. The process comprises three phases, which are planning, preparation and implementation (University of Kansas, 2018: online).

In the *planning phase*, the facilitator has to engage intensively with the material to be facilitated, to enhance own proficiency, confidence and the ability to answer questions that may arise during the workshop. The facilitator should determine the knowledge level of the participants about the topic of interest. This enables the facilitator to pitch the workshop at the right level for all the participants, to ensure maximum participation. The time factor has to be taken into consideration. A well facilitated workshop is one that can achieve all its objectives in the allocated time for facilitation, without hurrying the participants. Therefore, a pilot of the workshop should be done, to ensure that time allocated is adequate for facilitation. Activities during the workshop need to be varied in order to continuously capture the attention of the participants. The attention span of most adults starts to decline after 15 to 20 minutes (Bradbury, 2016: 5123). There has to be time allocated for evaluation of the workshop by the participants, who should reflect on their participation in the workshop.

The *preparation phase* involves the logistics of the workshop. The facilitator needs to know how much space is available for holding the workshop, and must ensure that all the

materials that are necessary for the workshop, such as pencils, flip charts and workshop handouts, are made available for the workshop to be organised (Pavelin *et al.* 2014: 2).

The *implementation phase* involves the actual presentation of the workshop. The facilitator should be organised and follow the programme for the workshop, which was developed during the preparation phase. Interactive workshops will only be successful if they are designed around the topics that the adult learners find relevant to the problems they encounter regularly (Dewell, Hanthorn, Danielson, Burzett, Coetzee, Griffin, Ramirez & Dewell, 2015: 2).

2.4.5 Activities used in interactive workshops

In order to deliver successsful interactive workshops, the activities of the workshops have to cover the different learning styles of the particpants (Nicholson *et al*. 2016: 2). The different learning styles include visual, auditory, reading and kinesthetic styles, which are discussed in detail in Section 2.5. Using different activities in interactive workshops enhances the concentration of learners. The activities include, but are not limited to, discussions, role playing, case studies, simulation, games, and videos.

Discussions are essential in interactive workshops, because they encourage openness and trust in the sharing of ideas. Small-group discussions involving health care professionals and the families of sick children were used in a study to enhance family-centred care in caring for neonates. The results were positive, with improved collaboration between nurses and the parents being reported regarding the care of their neonates (Trajkovski, Schmied, Vickers & Jackson, 2015: 243). In another study, which assessed and raised awareness and knowledge and improved attitudes of health care providers about female genital mutilation, small-group discussions and debates were implemented in four 90-minute interactive workshops. There was a significant increase in knowledge of female genital mutilation after the interactive workshops (Elliott *et al.* 2016:71).

The incorporation of the various activities in interactive workshops is guided by various principles that underpin interactive workshops.

Role playing is essential, because it mimics the real clinical environment. Most health care interactive workshops involve role playing as part of their interactive activities. In a study to establish the ability of midwives to offer bereavement support for mothers after miscarriage, it was evident that the skill was absent. Interactive workshops provided an opportunity to enhance the confidence of newly qualified midwives to render bereavement support to bereaved families (Doherty, Coughlan, Casey, Lloyd, Sheehy, Brosnan, Barry, McMahan & Cullen, 2018: 523). A study to determine whether interprofessional interactive workshops would improve the attitudes of students towards teamwork, role play was used (Erickson, Blackhall, Brashers & Varhegyi, 2015: 876-877). Role play creates a learning environment that has authentic similarities with the real clinical environment. Role play provides experiential learning, which has proven to be beneficial to health providers (Saldert, Forsgren & Hartelius, 2016: 572). Role play was used in a study to reduce pain and disability among nurses with lower-back pain. Follow-up studies revealed that the participants had improved preventive behaviours needed to reduce lower back pain and associated disabilities (Ghadyani, Tavafian, Kazemnejad & Wagner, 2017: 398).

Case studies are essential in interactive workshops, because they encourage critical thinking and sharing of ideas around a topic for learning purposes (O'Flaherty & Phillips, 2015: 85; West, 2016:125). As a result, there is prolonged retention of the acquired knowledge (Habibzadeh *et al.* 2017: 84). A study to enhance family nursing care in interactive workshops utilised case studies. The participants reported enhanced knowledge of family nursing (Yamazaki, Tsumura, Mine, Kimura, Soeda, Odatsu & Kiwado, 2017:3). Case studies, in combination with small-group discussions, were used to establish the effectiveness of interactive workshops to enhance interviewing skills of new psychiatric nurses. The participants reported improved interviewing skills and self-confidence (Chen, 2017: 146).

Simulation is a technique that is used to replace real-life experiences with experiences that are guided to imitate the real-life aspects in an interactive manner (Clerihew, Rowney & Ker, 2016: 8). Simulation provides a safe environment for learners to learn without fear of making mistakes that could jeopardise their profession (So *et al*. 2019: 42). In a study to enhance interprofessional education, simulation was used in a four-hour interprofessional workshop (Jimenez, Thwaites, Juneja & Lewis, 2018: 106). Simulation was also used in an interprofessional interactive workshop to enhance positive attitudes of health professionals towards older adults (Halpin, 2015: 207). The results in both studies were positive.

Playing *games* is another method that is used in interactive workshops to facilitate learning. In a study to encourage and sustain breastfeeding, quiz games were used in interactive workshops that were facilitated for nurses and medical doctors to enhance their skills and knowledge of breastfeeding (Ballou, Wiseman, Jackson, Godfrey & Cagle, 2017: S204).

Videos are used in interactive workshops to enhance learning. Videos were used in a study to build the capacity of nurses in dealing with stressful family situations in oncology in-patient wards. After the participants watched the videos, they participated in small-group discussions. Participants reported having learnt important skills for dealing with oncology patients and their families (Zaider *et al.* 2016: 208).

In addition to the interactive activities discussed above, Kagan Cooperative Learning strategies (Gavin, 2011: online) were utilised to ensure that workshops were as interactive as possible. Kagan strategies have four guiding principles, which are positive interdependence, individual accountability, equal participation and simultaneous interaction (Kagan, 2007: online). The Kagan strategies include the round robin strategy, which involves participants sitting in groups and taking turns talking to each other in response to questions posed by the facilitator. Another strategy is the rally coach approach, which involves participants taking turns to solve a problem while others act as coaches for the task given. *Scenarios* were solved using the ‘timed pair share” Kagan

strategy. In this strategy, partners in a pair take turns to share with their colleague how they would solve the scenario problem, while the other listen. Another Kagan strategy that is employed in solving case scenarios is the rally robin, which entails participants turning to their partner and taking turns to generate ideas on how to solve a problem.

2.5 PRINCIPLES UNDERPINNING INTERACTIVE WORKSHOPS

Interactive workshops are a platform for knowledge transfer, and in order for interactive workshops to be an effective platform for knowledge transfer, they should have theoretical backing. Philosophies that have proven to support interactive learning are the philosophies of constructivism, constructive alignment, scaffolding and authenticity (Biggs, 2003; Bruner, 1975: 4; Roach *et al*. 2018: 497; Vygotsky, 1978: 3).

2.5.1 Constructivism

Constructivism is a learning theory that states that learners construct their own understanding and knowledge of the world, through experience and by reflecting on the experiences. Learning occurs in cultural contexts and social interactions (Fernando & Marikar, 2017: 111; Vygotsky, 1978: 3). The premise of the constructivism theory is that learning is enhanced when the learner is an active participant (Fernando & Marikar, 2017: 111). Under the premise of constructivism, learners construct knowledge based on their experiences. Learning occurs through the process of drawing connections between what is known and the new knowledge (Bada, 2015: 66). As learning takes place, learners have to accept the newly constructed knowledge; therefore, learners need to be actively engaged in constructing new knowledge. As knowledge is constructed, each learner goes through a reflection process, where they construct individual meaning for the knowledge, and ultimately own it (Dewey,1929 in Bada, 2015: 67). Learners will be able to apply the newly constructed knowledge and high-level cognitive skills in their future learning and careers. Even though there is individual construction of knowledge in constructivism, learning is a social activity. Learners construct knowledge together, using a common

language of communication in a set-up common to the learners. It is essential that the new knowledge that has to be learnt is relevant to the learner. If relevance is clearly outlined by the facilitator, learners will be motivated to learn (Sogunro, 2015: 27).

Nursing education is evolving to develop practice that is individualistic, holistic and therapeutic (Fawcett, 2017: 78). The evolution has to be guided by a framework that permits this change. Constructivism is a theory that supports the evolution, for the reason that the learner becomes the center of education. Constructivism underpins a learner-centred approach (Dagar & Yadav, 2016: 2). Constructivism takes into cognisance the prior knowledge that learners possess when they enrol at learning institutions. Prior knowledge, which can be acquired in formal institutions of learning, or informally, provides learners with a foundation on which to build their new knowledge. Constructivism also takes into account the sociocultural factors that influence learning. Learners construct knowledge that is viable in their respective societies. Viability of the knowledge is determined by the society according to the culture and values of the society in which the learners exist (Biniecki & Kang, 2014: 136).

- *Assumptions related to constructivism*

Assumptions that are associated with the constructivism theory include the following. New knowledge is constructed as learners make sense of their experiences (Barbour & Schuessler, 2019: 38). New knowledge is built onto already existing knowledge (Dennick, 2016: 204). Individuals construct knowledge as part of a community, but each person has their own, invisible worldview that they believe is the same as for the rest of the learners. This view remains invisible until it is challenged or confronted by another worldview, which will lead to construction of new meaning (Amineg & Asl, 2015: 11). Knowledge is content-dependent, so it is important for the facilitator to provide learning activities in authentic, relevant and realistic contexts (Cimermanova, 2018: 220; Gewurtz, Coman, Dhillon, Jung & Solomon, 2016: 61). In the learning process, learners create and test theory until a satisfactory meaning arises. Learning takes place when learners participate in authentic activities that are based on situations that the learners will encounter in real life

(Ekpenyong & Edokpolor, 2016: 153), and social interactions are vital to learning (Dagar & Yadav, 2016: 3).

- *Disadvantages/Limitations related to constructivism*

There are disadvantages associated with constructivism. One is that planning for the learning sessions is difficult for facilitators if they have not received enough training on the constructivist approach (Sertel & Yucel, 2015: 265). Students may ask questions that the facilitator may not have answers to. Poorly performing learners struggle with this approach of learning. An extensive amount of time is spent covering very little content (Dorit & Yariv, 2019: 439). Sertel and Yucel (2015: 265) report that constructivism becomes a challenge when there is not enough room in the classes for learners to engage in their activities.

- *Principle of andragogy*

The principle of andragogy states that adults are self-directed learners, therefore, they should be involved in deciding how they learn. Adults have prior knowledge, so their learning will focus on building onto what they already know. Adults are motivated to learn, so their learning should be focused on problem-solving, rather than memorising (Smyth, 2017: online). In order for learning to take place, adult learners employ their different learning styles.

- *Different learning styles*

Different learning styles have to be considered by the facilitator in order to enhance learning. A learning style is defined as a way that learners prefer to process information in order to maximise learning (Cuevas & Dawson, 2018: 41; Hussmann & O'Loughlin, 2019: 6). Knowledge of the learning styles of learners assists the facilitator to create learning activities that capitalise on the strengths of the different learners, thereby enhancing learning (Quinn, Smith, Kalmar & Burgoon, 2018: 358).

According to Flemming's VARK model, there are four main learning styles, namely, visual, auditory, reading and writing, and kinaesthetic learning styles (Hussmann & O'Loughlin,2019: 7). Visual learners learn best by seeing. Auditory learners learn best when they hear information. The reading and writing learner prefers to learn from information that is displayed as words, and, for effective learning to take place, they prefer to take down notes simultaneously. Kinaesthetic learners are tactile learners. These learners learn best when they touch and do things with their hands (Asiry, 2016: 13). However, some theorists argue that people practice all four learning styles, but that there is always a preferred style, which becomes the dominant one for each learner. The facilitator needs to be aware of the diverse learning styles of learners, in order to avail them with activities that enable exploration of their capabilities and critical thinking skills for solving the given problem in their different groups. Therefore, the facilitator needs to pose problems of emerging relevance that are challenging enough to engage the different learning styles and critical thinking skills of the learners (Dagar & Yadav, 2016: 3).

2.5.2 Constructive alignment

Constructive alignment is a theory that was postulated by Biggs (2003: Chapter 5). The theory works in agreement with constructivism. In constructive alignment, learners still construct knowledge, while they are guided by the activities formulated by the facilitator (University of Queensland, 2018: online). In addition, the facilitator has to ensure that learning outcomes are set for learners, and a relevant, supportive learning environment is provided, so that they will achieve the desired outcome (Morgan, 2019: 374). This means that the curriculum, intended learning outcomes, teaching methods and assessments have to be aligned to each other prior to the actual learning taking place (Ali, 2018: 73; Biggs, 2003: Chapter 5; Wilkhamn, 2016: 18). The learning environment that is set up by the facilitator has to maximise the likelihood of all students engaging with the activities, in order to achieve the intended outcomes through construction of meaning. The assessment criteria that the facilitator uses to measure attainment of the learning

outcomes should show the extent to which each learner will have attained the intended outcomes.

The effectiveness of constructive alignment can be determined when learners receive timely feedback on their assessments. The feedback should motivate the learners to improve their performance (Ali, 2018: 74). There are two main types of assessment, namely, formative and summative assessment. The formative type of assessment offers the facilitator an opportunity to give learners feedback about their progress. The facilitator can also get information about the learning requirements of the learners and plan together with the learners how they intend to improve the learners' performance (Gallagher, 2017: 8)

- *Advantages of constructive alignment*

Constructive alignment emphasises the importance of giving feedback soon after assessment, which encourages students who want to engage more with the learning material in order to improve their performance (Cain, Grundy, & Woodward, 2016: 571). Immediate feedback enables identification of the weaknesses of the learners by both the facilitator and the learners, so that they can come up with solutions (Gallagher, 2017: 8). Constructive alignment ensures that learners are definitely equipped with knowledge, as well appropriate skills, to perform the skill intended by the learning outcome (Onsman, 2015: 8). Constructive alignment leads to standardisation, and fairer and more reliable assessment results (Biggs, 2001: 223).

- *Disadvantages of constructive alignment*

The facilitator of learning has to invest a great deal of time if constructive alignment is to be effective (Onsman, 2015: 8). If the class has a large number of learners, giving feedback becomes a challenge for the facilitator. Language can pose a challenge when clear and constructive feedback is to be given, especially in a class of learners using a variety of languages. Facilitators of learning can be faced with the challenge to distinguish the different levels of competencies of learners, which affects the amount of feedback to

be given. Facilitators can also lack sufficient knowledge of how to align learning outcomes, learners' activities and assessments. This lack of alignment can affect construction of knowledge by learners (Botma & Nyoni, 2015: 4). While learning takes place, learners should be supported in a process known as scaffolding (Pol, Volman, Oort & Beishuizen, 2015: 617).

2.5.3 Scaffolding

Scaffolding is a way of raising the performance of learners, from their current, independent level of performance, to a higher, assisted level, at which the provision of support guarantees success (Bruner, 1975: 4; Pol *et al.* 2015: 616). Scaffolding originates from the concept of zone of proximal development by Vygotsky. Vygotsky (1978: 7) postulates that, while learning takes place, there are tasks that learners can do independently, and others that are beyond their capabilities. The area between what the learners can do independetly and that which they cannot do is the zone of proximal development (Eun, 2019: 19). The idea of a zone of proximal development suggests that learners learn best just beyond their range of existing experience, and if they receive assistance from the facilitator and their peers. Assistance in the zone of proximal development forms a bridge between what learners can do independently and what they can do with assistance. Assistance in the zone of proximal development is referred to as scaffolding (Aslam, Khanam, Fatima, Akbar & Muhammad, 2017: 3).

In order for learners to be able to construct their own knowledge, the facilitator of learning should provide an environment that supports learning. The facilitator has to provide interactive and relevant learning activities that encourage the development of critical thinking skills in a social context (Dagar & Yadav, 2016: 3). As learners work together to construct knowledge, the facilitator presents challenges that are slighlty above their capabilities and knowledge. The experience of being able to complete the challenging tasks successfully boosts learners' confidence and, hence, their motivation to embark on more complex tasks (Vygotsky, 1978: 7). However, the support that is offered in the zone

of proximal development has to be tapered off as the learner becomes competent and independent (Aslam *et al*. 2017: 3).

- *Advantages of scaffolding*

Scaffolding instruction enables learners to engage with material while they build on their prior knowledge to construct new knowledge. In the process of supporting the learner, the facilitator has the opportunity to motivate learners with low self-esteem by giving positive feedback (Coombs, 2018: 199). As a result, the motivated learner will have fewer moments of frustartion.

- *Limitations of scaffolding*

The scaffolding method can pose challenges for the facilitator of learning. One of the challenges is that the method is time-consuming, since the facilitator has to allow learners to learn at their own pace. If there are a large number of learners in the class, implementation of individualised scaffolding instructions becomes almost impossible (Aslam *et al.* 2017: 4).

2.5.4 Authenticity

Authenticity is defined in the Cambridge Dictionary (2019: online) as the quality of being real or true. Authenticity in learning refers to the state where learning environments provide a learning context that reflects the way knowledge and skills will be used in the real environment (Bland, Topping & Tobbell, 2014: 1114; Roach *et al*. 2018: 497). The facilitator of learning has to strive to always provide authentic learning environments and tasks, in order to motivate learners to deepen their level of understanding and improve information recall (Woods, 2016: 35).

Authentic learning environments can be utilised in interactive workshops, as learners construct knowledge in groups. In conclusion, participants have to give feedback on the workshops, by completing evaluation forms that should be collected at the end of the

workshop from each of the participants (Mohd, Yusof, Lai, Hossain, Ramalingam, Hamid, Ng & Mansor, 2019: 3).

2.6 ASSESSMENT METHODS USED DURING INTERACTIVE WORKSHOPS

2.6.1 Multiple choice questionnaire

In order to assess the effectiveness of interactive workshops, it should be established whether change has occurred in the phenomenon under investigation. In a study by Tryaki and Cinar (2016: 159), a *multiple choice questionnaire* was used in the pre/post experimental study, to measure knowledge of the management of continuous positive airway pressure in newborns. The results of the posttest were significantly improved after the interactive workshop. Pre- and posttest surveys are also used in some interactive workshops. In a study to determine the efficacy of group interventions on the mental health of nurses aged 45 and older, self-report questionnaires were used for the pre- and posttests (Maatouk, Műller, Angerer, Schmook, Nikendei**,** Herbst, Gantner, Herzog & Gűndel, 2018: 5).

- *Advantages of multiple choice questionnaires*

Multiple choice questionnaires have a number of advantages. They are an affordable means of gathering data, and a quick method of getting results from a large group of participants. Statistical analysis of results is easy. A sense of anonymity and privacy for participants is enhanced by the use of multiple choice questionnaires (Botma, Greeff, Mulaudzi & Wright, 2010: 135).

- *Disadvantages of multiple choice questionnaires*

There are diasdavantages associated with the use of multiple choice questionnaires. Participants can sometimes avoid providing truthful responses. Some questions on the questionnaire can remain unanswered. Participants can fail to get the meaning intended from the questionnaire, leading to subjective and skewed results. Multiple choice

questionnaires fail to capture the emotional responses of participants. If the multiple choice questionnaires are too long, participants tend to give quick responses without thinking them through first, thus, affecting the validity of the results (Botma *et al.* 2010: 135).

2.6.2 Likert scale questionnaire

The effectiveness of interactive workshops can also be assessed by using Likert scale questionnaires (Elliott *et al.* 2016: 74; Higuchi, Edwards, Carr, Marck & Abdullah, 2015: 30). A Likert scale is an ordinal psychometric measurement of attitudes, beliefs and opinions. In a study to train health professionals working with people affected by female genital mutilation, a five-point scale was used by participants to evaluate the effectiveness of the workshop (Elliott *et al*. 2016: 74).

- *Advantages of Likert scales*

Likert scale use has certain advantages. It is a universal method of data collection, so is easily understood. Likert scales offer a degree of flexibility, unlike that of concrete yes or no answers; this flexibility makes it easy for participants to respond. The responses in a Likert scale accommodate neutral and undecisive responses. This method of data collection is quick, efficient and cost-effective. The researcher can quantify the feelings of the participants (Polit & Beck, 2017: 347).

- *Disadvantage of Likert scales*

The disadvantage that is associated with Likert scales is that participants often avoid selecting responses in the extremes, because of negative ideas associated with extremists (Polit & Beck, 2017: 347).

A number of research engines were accessed in search for authentic literature to support the construction of the review of literature in this study. The platforms that were accessed include the following CINAHL with Full Text ,MEDLINE with Full Text, Academic Search

Complete, PsycINFO, Health Source: Nursing/Academic Edition, ERIC, Africa-Wide Information, CAB Abstracts, SocINDEX with Full Text, MasterFILE Premier, American Doctoral Dissertations, Business Source Complete, PsycARTICLES, Communication & Mass Media Complete, and EconLit with Full Text. The literature accessed from these platforms was essential in providing relevant and empirical information that supported the implementation of this study.

2.7 SUMMARY

In this chapter, a discussion of the review of literature was given. The feasibility of managing Type 2 diabetes mellitus using the six key diabetes messages at PHC level was discussed. Information on the use of interactive workshops as a training platform for continuous professional development was outlined, together with principles that underpin the development and facilitation of interactive workshops. In conclusion, methods of evaluating the effectiveness of the interactive workshops were discussed.

In Chapter 3, the methodology of the study will be discussed in detail.

CHAPTER 3:
METHODOLOGY

3.1 INTRODUCTION

Methodology refers to rules and procedures that a researcher ought to follow in conducting investigations. Methodology comprises the following: research design, research methods and data analysis (Botma *et. al.* 2010: 41). In this chapter, the methodology that was employed in the four stages of the study, as shown in Figure 1.3, will be discussed. The discussion will focus on the research design of the study, research methods for the four stages of the study according to the research technique, population and sampling methods, data collection process, validity and reliability data analysis and ethical considerations.

3.2 RESEARCH DESIGN: EXPLORATORY EXPERIMENTAL PRETEST-POSTTEST CONTROL GROUP DESIGN

The University of Southern California (2017: online) defines research design as the general approach that is selected for the comprehensive and consistent integration of the various components of a study. The design, therefore, is the framework for data collection and analysis. This approach is reiterated by Morroni and Myer (2007: 77), who define research design as an approach that encompasses the population, sampling techniques used, data collecting tools, the data gathering procedure and the data analysis.

The aim of the study was to establish the feasibility of implementing interactive diabetes workshops to PHC nurses in a Free State sub-district. In order to ensure success in the implementation of the workshops, careful planning was paramount. Thus, it was essential to select the most appropriate research design, to ensure meticulous planning, data collection and analysis. The research design that was used for this study was an

exploratory experimental, pretest-posttest control group design. An elaboration of the research design of this study will be provided in the next sections.

3.2.1 Quantitative research

Quantitative research is research that is associated with quantifying and controlling phenomena in an attempt to establish predictions of relationships among measurable variables (De Vos *et al*. 2011: 63). In this type of research, phenomena are measured in a systematic, structured manner (Babbie, 2010: 33). In this study, the researcher sought to establish the feasibility of interactive diabetes workshops for PHC nurses in a Free State sub-district. Hence, a quantitative research design was chosen to determine diabetes-related knowledge before and after the interactive diabetes workshops. Furthermore, the researcher wished to assess the feasibility of presenting interactive diabetes workshops for PHC nurses.

Quantitative research designs have their strengths and weaknesses, as outlined below. According to Heale and Twycross (2015:66-67), the strength of these designs is that results from quantitative research designs, to a great extent, are objective and more precise, because this design uses standard procedures that guarantee *validity and reliability*. Literature informed stages of the study, as depicted in Figure 1.3. The researcher followed research methodology principles in order to ensure objectivity.

However, a limitation of quantitative research, as pointed out by Simundic (2013: 12-15), is that, as long as the researcher is the one who develops the questions in the questionnaire to be used to collect data, there is a high chance of *structural bias and false representation*. The reason for the bias is that the collected data could actually reflect the views of the researcher, instead of that of the participants. In this study, bias and false representation were minimised by the use of information from a previous study that had identified the six key diabetes messages that nurses needed to be reminded of (Reid *et al*. 2018: 128). The content of the questionnaire was informed, furthermore, by an adapted South African Diabetes KAP questionnaire (Le Roux *et al*. 2019: 86).

3.2.2 Exploratory design

Exploratory research design is a research design that is used to conduct research in order to solve a problem in an area where not much research has been done (Reiter, 2017: 144). Exploratory research is used for a number of purposes, among which the determination of the feasibility of carrying out research, developing interventions, and gaining a clearer understanding of the context in which the intervention is to take place (Hallingberg, Turley, Segrott, Wight, Craig, Moore, Murphy, Robling, Simpson & Moore, 2018: 2; Neuman, 2011: 38; Polit & Beck 2017: 610). The aim of the study was to determine the feasibility of interactive diabetes workshops for PHC nurses in a Free State sub-district. There is not much literature on using interactive workshops to train nurses in the Free State sub-district, making this a new intervention whose feasibility had to be explored. Therefore, an exploratory research design was appropriate for this study.

The exploratory research design has strengths and weaknesses associated with its use, as outlined below.

- *Advantages of exploratory research*

The results of studies using this design can be used to *develop initial groundwork*, which can be applied in future research (Hallingberg *et al*. 2018: 10). In this study, the design was used to establish possible interactive activities that can be employed in the facilitation of interactive workshops.

- *Limitations of the exploratory design*

In most cases, *exploratory research designs use small samples, making generalisation of the study results impossible* (Hallingberg *et al*. 2018: 10). However, the rigorous process that was followed by this study made this methodology more valid and reliable. Therefore, the methodology can be used in different contexts.

3.2.3 Experimental design

According to Creswell (2014: 13), an experimental design is defined as a research design that is used when researchers wish to determine the influence of a specific intervention on an outcome. In order to determine this influence, the participants are allocated to either of two groups, the experimental and the control groups (Gray, 2014: 146). Specific treatment is given to the experimental group while the treatment is withheld from the control group. The score of both groups on an outcome is then determined. For a design to be a true experimental design, it has to have three essential characteristics, which are randomisation, control and manipulation (Brink, van der Walt & van Rensburg, 2017: 102). In this study, an experimental research design was used to establish the feasibility of interactive diabetes workshops for PHC nurses in a Free State sub-district. The PHC clinics in the Free State sub-district were randomly allocated into the experimental and control groups, with nurses working in these clinics then forming part of either the experimental or control group.

According to Nownes (2019: 648-672), a control group is the group of participants that does not receive the intervention that the researcher has an interest in studying. In this study, the control was the nurses that work in the five randomly selected PHC clincs in Botshabelo. These nurses did not have interactive diabetes workshops conducted for them, instead, they only took the pretest and posttest. The results of the control group served as a comparison to establish if the change in diabetes knowledge in the experimental group was possibly due to the interactive diabetes workshops.

Experimental manipulation is a process in which the researcher purposely influences the independent variable (Brink *et al.* 2017: 102). In this study, the researcher had influence on the interactive diabetes workshops that were conducted for nurses in the experimental group. Comparison of the results from the pretests and posttests of both the experimental and control groups was then based on the possible effect the interactive workshops had on the diabetes knowledge of the nurses.

- *Strengths of the experimental design*

The experimental design has its own strengths and limitations. These will be outlined below. The strengths of the experimental design include that such designs are:

- The most suitable methods for *drawing better causal conclusions* about interventions, because of their characteristics of having a control group and an experimental group, coupled with manipulation (Polit & Beck, 2017: 55). In this study, the use of experimental and control groups enabled the drawing of causal conclusions with regard to the interactive diabetes workshops, which were only implemented on the experimental groups; and
- *Repeatable,* which allows for the verification of results (Polit & Beck 2017: 208). The characteristic of repeatability stems from the fact that experimental research is based on standard procedure informed by literature. All the steps that were taken in the four stages of the study were guided by literature and an audit trail of each stage was maintained.

- *Limitations of the experimental design*

The experimental design *requires extensive statistical* analysis, which could pose analytical challenges for a novice researcher (Gray, Grove & Sunderland, 2016: 336). However, in this study, a biostatistician assisted with the statistical analysis of the research results.

Experimental environments tend to be quite *artificial*. As a result, participants tend to behave in a manner that might not reflect their true behaviour in a non-experimental environment (Polit & Beck, 2017: 212). This limitation was reduced to some extent by convening the interactive diabetes workshops in the PHC clinics where the nurses work.

There are some *extraneous variables* that the researcher may *fail to control*, such as the mood, health and life experiences of the participants, which can influence the reaction of the participants to the intervention (Botma *et al*. 2010: 120). For this study, the researcher

was not aware of any other variables that could have influenced the outcomes of the interactive workshops, although this does not exclude the possibility of such variables.

3.2.4 Pretest-posttest design

In a pretest-posttest design, the expected outcome is, measured first by means of a pretest, prior to implementation of the intervention, to establish a reference point for the phenomenon under investigation. This is followed by measurement of the same phenomenon subsequent to the implementation of the intervention (Smithikrai, 2016: 527). In this study, a pretest-posttest design was used, which required participants in both the experimental and control groups to respond to a questionnaire in the pretest stage, to measure their knowledge of the six key diabetes messages prior to the implementation of the interactive diabetes workshops for the experimental group. The same questionnaire was used for both the pretest and the posttest. Subsequent to the interactive diabetes workshops for the experimental group, participants responded to a posttest to measure their knowledge on the six key diabetes messages. The posttest was administered to both the experimental group and the control group. A pretest-posttest design has its own strengths and limitations.

3.2.4.1 Strengths of the pretest-posttest design

One of the strengths of a pretest-posttest design is that this research design follows standard and systematic steps of data collection, leading to *objective and valid results* (Gouldthorpe & Israel, 2016: 2). The questionnaire used in this study (see Addendum G) was adapted from the Health-Related Quality of Life, EQ-5D-3L instrument by the Euroqol Group (cited by Cardoso, Cruz, Queiros, Santiago, Ribeiro & Ferreira, 2016: 34), as well as a Type 2 diabetes mellitus knowledge, attitude and practice questionnaire used in the Free State, South Africa (Le Roux, Walsh, Reid & Raubenheimer, 2019: 86). By using information from these three instruments to develop the questionnaire used in this study, the objectivity of the content was improved.

3.2.4.2 Limitations of the pretest-posttest design

Limitations of a pretest-posttest design are the following:

- The assumption in the pretest-posttest design is *groups are equivalent* due to random assignment (Gouldthorpe & Israel, 2016: 6). The fact that the participants in the study were nurses in PHC clinics in a Free State sub-district did not necessarily mean that the experimental and control group were equivalent. There are many reasons that could lead to the two groups not being equivalent, among which, the educational qualifications of the nurses. In this study, the factors that enhanced equivalence were that all the nurses were in a PHC setting within the same health care system, and all were working with diabetes patients.
- Developing a test with solid items that assess factual knowledge is time-consuming (Botma *et al.* 2010: 120). The literature search that was conducted in this study to find literature on diabetes, in order to develop a questionnaire that aligned with the six identified key diabetes messages, was time-consuming. However, the researcher sought the assistance of the librarian in the Faculty of Health Sciences at the UFS, and two independent reviewers, to develop the tool, and their assistance expedited the process.

3.2.5 Control group

Pithon (2013: 1) defines a control group as a group of participants in an experimental research design that does not get the intervention and becomes the baseline upon which the effect of the intervention on the results is measured. Establishing a control group is quite a challenge, due to the ethical implications involved. Running experiments with controls is quite difficult, because the participants who fall in the control group tend to complain about unfair treatment, as they do not get to experience the intervention (Gray *et al.* 2016: 233). In this study, measures were taken to overcome this limitation. It was decided that, if, at the end of the research study, the results showed an improvement in

the knowledge of the six key diabetes messages, the participants in the control group would be given the opportunity undergo the same training offered by the interactive diabetes workshops.

3.3 RESEARCH METHOD

Research method refers to the techniques used for data collection, statistical techniques that are employed to establish relationships between data and the unknowns, as well as methods used to evaluate the accuracy of the results obtained (Kothari, 2007: 8). The study had four different stages, as set out in Figure 1.3. Each of the study stages employed different research methods. The research method for each of the stages focused on the research technique, population and sampling, piloting, data collection, rigor, analysis and ethical considerations.

3.3.1 Stage 1: Development of the interactive diabetes workshop programme

The objective of Stage 1 was to develop an interactive workshop programme according to key diabetes-related messages that had been identified previously by Reid *et al*. (2018: 122-131). In order to plan the interactive workshops, a literature search was conducted. A literature search involves a critical analysis of published sources on a particular topic (Mongan-Rallis, 2014: online). The literature that was selected provided empirical evidence of the activities that have been used successfully in previous interactive workshops. Results of the literature search informed the design used in the study, the selection of interactive activities to be used in the interactive workshops, the role players in the interactive workshops, the content to be covered, the feasibility of the interactive workshops, and the duration of the interactive workshops. A systematic search for literature was employed. Once the activities had been identified, the interactive diabetes workshop programme was developed.

- *Steps of systematic literature search*

In order to perform a systematic search for literature, the first three steps of the systematic review process recommended by Higgins and Green (2011: online) were followed. The researcher was assisted by the subject librarian of the Faculty of Health Sciences of the UFS. The following discussion will refer to the steps that were followed in the systematic search for literature.

Step 1: Identification and formulation of a focused research question

During this step, a focused research question was generated, based on the so-called PICO format, where PICO represents the population of the study, intervention, control and outcome. The PICO was formulated as follows:

P: Health workers

I: Interactive workshops

C: Routine lectures

O: Feasibility of interactive workshops as evidenced by the ease of implementation of interactive workshops and changes in the diabetes-related knowledge are reported by the pre- and posttests.

The focused review question that was used for the literature search was: *What is the feasibility of interactive workshops for health professionals?*

Step 2: Generating a search strategy

The inclusion and exclusion criteria were set. According to Polit and Beck (2017: 274), the inclusion and exclusion criteria refer to those characteristics of the population that made articles eligible to be part of the study population, or that disqualified them. Articles were only included when the:

- Study population consisted of health professionals;
- Results of the study indicated easy implementation and increased knowledge; and

- Interactive workshops were used as interventions.

Articles were excluded when they:

- Consisted of research briefs, research news or editorials; and
- Presented a collaboration between health professionals.

Available electronic databases were used for the literature search. Details of search words, databases and number of abstracts obtained will be given in Chapter 4.

Step 3: Search for articles

In this step, the search strategy was executed and a sample of abstracts was extracted. This sample was filtered using the inclusion and exclusion criteria. The researcher verified the filtering process with two independent reviewers. Full articles of the abstracts that met the inclusion criteria were accessed, to determine if the articles did indeed comply with all inclusion criteria. These studies' content was then scrutinised to identify the following about the interactive workshops: design to be used in the study, type of interactive activities, role players, content to be covered, feasibility and duration.

3.3.2 Stage 2 and 4: Pre- and post-testing of diabetes-related knowledge

The objective of Stages 2 and 4 was to determine diabetes-related knowledge of PHC nurses by means of a pretest and posttest diabetes-related questionnaire (Addendum G) in Stages 2 and 4 of the study.

- *Research technique – questionnaire*

Research methods reflect the technique that is appropriate for using in the structure of a study and to gather and analyse information relevant to the research question (Polit & Beck, 2017: 68). A questionnaire, Addendum G, was used as a data-collecting tool in the pretest and posttest.

According to Polit and Beck (2017: 70), a questionnaire is a tool that offers a participant confidentiality, which enhances the probability that they will give honest answers. The

participants in this study were free to give honest answers, because they did not have to write their names on the questionnaires. All questionnaires were identifiable only by codes. The questions in the questionnaires were aligned to the established key diabetes messages. Development of questions in the questionnaire was guided by literature. However, the questions were not validated in any previous research.

A questionnaire has its own strengths and limitations, as outlined below. The strengths include the following:

- According to Gray *et al*. (2016: 425), the questions in a questionnaire are *consistent.* All participants have to respond to the same questions, which rules out the possibility of researcher bias. In this study, the questions in the questionnaires were the same for all the participants in the control and the experimental sites during pre- and post-testing, which ensured consistency of the data collected;
- Results can easily be *quantified* by the researcher or by use of a software package such as Excel and SPSS (Botma *et al*., 2010: 166-169). The data analysis in this study was generated using SAS/STAT software, Version 9.4 of the SAS System for PC. Copyright © 2019 SAS Institute Inc.; and
- Results from a questionnaire are *objective* (Polit & Beck, 2017: 305). The results of this study were objective, since the development of the content of the questionnaire was guided by literature. Expert co-researchers in the field of the study were also involved in the development of the questionnaire.

A possible limitation when using a questionnaire could be that it may be difficult to *motivate potential* participants to complete the questionnaire (Polit & Beck 2017: 306). In this study, motivating participants was not a challenge, because participants verbalised that the interactive workshops provided a diversion from their ever-busy schedules with patients.

- *Population and sampling*

A population is the entirety of people, events or elements, or a collection of cases within the universe that meet certain criteria for inclusion in a study (Botma *et al.* 2010: 123; De Vos *et al*. 2011; Polit & Beck, 2017: 273). The population for Stages 2 and 4 was all nurses providing health care at the 13 PHC clinics in Botshabelo and the five PHC clinics in Thaba Nchu. All these clinics are within a 15 km radius of the towns of Botshabelo and Thaba Nchu.

PHC clinics in Botshabelo (control sites) were selected using the random sampling method. Random sampling is a sampling technique where a group of subjects, called the sample, are selected from a larger group, the population, to represent the entire population (Polit & Beck, 2017: 280). In random sampling, each individual subject is chosen entirely by chance and each member of the population has an equal chance of being included in the sample (Saunders, Lewis & Thornhill, 2012: 102). Random sampling of PHC clinics in both the experimental site, Thaba Nchu, and the control site, Botshabelo, was done. Random sampling was done for PHC clinics within a 15 km radius of both Thaba Nchu and Botshabelo towns. Random sampling of PHC clinics was followed by convenience sampling of the 21 available participants in Botshabelo and 22 participants in Thaba Nchu. Convenience sampling of participants was based on the criteria that participants were:

- Employed by the Free State Department of Health as nurses;
- Nurses providing health care to patients diagnosed with any type of diabetes at the sampled PHC clinics; and
- Willing to participate in the research.

Table 3.1 illustrates the number of nurses at each of the experimental sites, Thaba Nchu and control sites, Botshabelo, after convenience sampling.

Table 3.1: Sample of participants at the experimental and control sites

EXPERIMENTAL GROUP (N=21)		CONTROL GROUP (N=21)	
Clinic	**Sample of participants (n=21)**	**Clinic**	**Sample of participants (n=21)**
A	4	F	5
B	4	G	4
C	3	H	3
D	6	I	5
E	4	J	4

- *Pilot study*

According to Polit and Beck (2017: 169), a pilot study is a small-scale version of the major study. A pilot study of the questionnaire was carried out at an identified PHC clinic in Botshabelo, which had a similar setting as the PHC clinics in Thaba Nchu and Botshabelo. However, the pilot study clinic was not one of the clinics sampled for the study. Data from the pilot study revealed that the questionnaire was too long and needed adjustment. Therefore, the questionnaire had to be adjusted from 30 questions to 12 questions. Results from the pilot study were excluded from the study.

- *Data collection*

According to Polit and Beck (2017: 59), data collection in quantitative research is a process of gathering the information that the researcher intends to collect following a certain pre-established plan. The plan specifies where and when the data will be gathered, how the data will be collected, what kind of data will be collected and why the data has to be collected.

Data about the diabetes-related knowledge of PHC nurses pertaining to the six key diabetes messages was collected at the pre- and posttest stages, that is in Stage 2 and Stage 4 of the study respectively. All pretest and the subsequent posttest questionnaires were completed by participants individually on the same prearranged days at both sites. Participants used unique codes on their questionnaires to enhance confidentiality. The questionnaires (Addendum G) were collected by the researcher directly after they had been completed, and stored safely.

Data from the pilot study was collected by the researcher soon after completion of the interactive workshop. Data was captured by the researcher onto an Excel spreadsheet. The Excel spreadsheet was verified as workable by the biostatistician. This spreadsheet was used to capture data for the main study.

- *Analysis*

Statistical analysis was done by the Department of Biostatistics, School of Basic Medical Sciences, Faculty of Health Sciences at the UFS, using descriptive statistics, frequencies and percentages for categorical data and medians and percentiles for numerical data for the pre- and posttests. The change from pre to post was calculated and described by means of McNemar's test for paired data.

3.3.3 Stage 3: Facilitation of interactive workshops and assessment of the feasibility of interactive diabetes workshops for primary health care nurses post the interactive workshops, by means of a Likert scale

In Stage 3, the researcher facilitated interactive diabetes workshops at the experimental site, Thaba Nchu PHC clinics, only. At the end of the interactive diabetes workshops, participants evaluated the workshops using a five-point Likert scale (Addendum H). The 10 articles retrieved from the literature search guided the development of the five-point Likert scale.

The literature search in Stage 1 informed the identification of the most appropriate activities that were used in the interactive diabetes workshops. In order to run successful workshops, the facilitator has to have a comprehensive workshop programme prior to the day of the workshop (Ballou *et al*. 2017: 202-206). Therefore, development of the interactive diabetes workshop programme was based on the guidelines that were obtained from the systematic search for literature.

- *Population and sampling*

The population was the same as the one used in Stages 2 and 4.

- *Pilot study*

  The pilot study for Stage 3, presenting interactive diabetes workshops, was done at a PHC clinic in Botshabelo. The PHC clinic was not in the town of the experimental sites; however, it had similar characteristics as the PHC clinics at the experimental site. The aim of the pilot study was to finalise the data collection instrument and pilot the interactive diabetes workshops. Data from the pilot study was not included in the main study. No changes were made to the programme that was used for the pilot study, for the main study.

- *Facilitation of interactive diabetes workshops*

The researcher made appointments with the responsible nurse manager of each of the five PHC clinics in Thaba Nchu, to fix specific dates on which the interactive diabetes workshop would be carried out. Each PHC clinic had a day allocated for a 45-minute workshop. The interactive diabetes workshops had six objectives related to the six key diabetes messages. During the interactive diabetes workshops, participants engaged in various activities. The interactive diabetes workshop programme, Addendum F, illustrates how the workshops proceeded. At the end of each workshop, participants evaluated the workshops using a five-point Likert scale (Addendum H). Participants were requested to use similar codes to the ones on their pretest and posttest questionnaires. The researcher

collected the five-point Likert scale forms soon after completion by participants and sealed them in an envelope.

In order to ensure the accuracy of the results, the data was entered onto two separate Excel spreadsheets, of which the correctness was verified by a biostatistician. Any coding errors were rectified by the researcher, who then submitted the data for analysis by the biostatistician.

3.4 ETHICAL CONSIDERATIONS

The researcher observed specific ethical considerations during each stage of the research process. The way these considerations were applied is provided per research stage. Ethics refers to the standards that guide the manner in which research is carried out, with the intention of ensuring that data is not falsified, and to promote the primary goal of research, which is the pursuit of knowledge and truth (Grand Canyon University, 2019: online). Ethical considerations must be observed at all stages of the research process (Botma *et al*. 2010: 4).

Ethics approval was obtained from the Health Sciences Research Ethics Committee (HSREC) of the UFS (HSREC approval, Addenda A and B). Permission to conduct the research at the PHC clinics was requested from the Free State Department of Health (Addendum B). These aspects are discussed below for each of the four stages.

3.4.1 Stage 1: Development of the interactive diabetes workshop programme

Ethical issues pertaining to data from journal articles evolved around the four principles of the Singapore Statement on Research Integrity (World Conference on Research Integrity, 2010: online). The four principles are honesty, accountability, professional courtesy and fairness, and good stewardship of research on behalf of others. Honesty was ensured in this study by reporting on the procedures that were followed and reporting on the findings of the study.

A paper trail of all the articles that were accessed and used in this study was kept, in order to ensure accountability. In order to ensure professional courtesy and fairness, the researcher acknowledged work of others by citation, and by working with the librarian who assisted to access literature. During the search for literature, keeping clear and accurate records of literature cited and guarding against plagiarism enhanced good stewardship of research on behalf of others.

3.4.2 Stages 2, 3 and 4: Pre- and post-testing of diabetes-related knowledge and facilitation of interactive workshops

Nursing research largely deals with human subjects, so researchers have to ensure that these human subjects are protected as much as possible (Polit & Beck, 2017: 150; Speziale & Carpenter, 2007: 57). As a result, professional nurses should design research that endorses the ethical principles that protect human rights (Botma *et al.* 2010: 2-3).

The Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1978: 4-8) is one of the codes that is used to ensure protection of human rights in research. The researcher adopted concepts in the Belmont Report as the main ethical framework for Stages 2, 3 and 4. Three broad principles, namely, the principle of beneficence, principle of respect for persons, and the principle of justice in the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1978: 4-8; Speziale & Carpenter, 2007: 61) were applied in three stages, 2, 3 and 4, of this study. A description of application of the principles is outlined below.

- *The principle of beneficence*

According to Botma *et al.* (2010: 24), beneficence refers to the fact that participants have the right to be protected from harm and discomfort, and that security of their well-being must be ensured. The principle has three dimensions, which are freedom from harm, freedom from exploitation and the risk/benefit ratio.

Freedom from harm: According to Speziale and Carpenter (2007: 65), participants in a study should not be subjected to any form of unnecessary harm or discomfort. Research that deals with human beings is associated with a great deal of physical and emotional harm. However, in this study, in order to avoid physical harm, the researcher ensured that the environment where the interactive diabetes workshops were held was safe and familiar to the participants. The venues of the workshops were at the PHC clinics, which meant the environment was familiar ground for the participants. During the workshops, no participant was harmed.

Freedom from exploitation: Participants should not be subjected to a situation that the researcher had not prepared them for (De Vos *et al.* 2011: 119). In this study, the researcher made appointments with the nurses at the different PHC clinics prior to the date of data collection. On the day of data collection, the researcher gave the prospective participants information brochures (Addenda 4 and 5) about the study. The nurses who were willing to participate signed consent forms (Addendum E). None of the participants was coerced to participate in the study and they were free to discontinue participation at any stage. One participant withdrew from participating in the workshop because of competing work commitments.

- *The principle of respect for persons*

The principle of respect for persons has two dimensions, which are the right to self-determination and the right to full disclosure. These two dimensions are addressed in the concept of informed consent (Botma *et al.* 2010: 18; Polit & Beck, 2017: 157). *The right to self-determination* addresses the fact that human beings are autonomous beings who are capable of making their own decisions (De Vos *et al.* 2011: 160). In the study, participants could decide whether to participate in the various stages of the study. None of the participants at the experimental or control sites refused to take part in the study, except for one, who had to attend to an urgent work commitment.

The *right to full disclosure* ensures that all the potential participants receive all the information required for them to make informed decisions on whether to participate in the study (Polit & Beck, 2017: 154). In this study, the researcher issued information brochures, Addendum C and D, to the potential participants. The brochures clearly stated what the research was about. Those who were willing to participate were given consent forms to sign (Addendum E).

- *The principle of justice*

The principle of justice has two dimensions, which are the right to privacy and the right to fair treatment. According to Polit and Beck (2017: 168), all research that is done on human beings has an aspect of intruding into the private lives of the participants, to some extent, which violates their right to privacy. Therefore, all the data that is collected from participants has to be treated with the utmost respect by ensuring the strictest confidentiality and anonymity (De Vos *et al.* 2011: 120).

In this study, the *right to privacy* was upheld by using codes instead of the actual participant names. Participants did not write their names on the questionnaires (Addendum G), since a coded numbering system was used, thus, ensuring confidentiality. Each participant's pre- and posttest questionnaire had the same code. The data was always kept in a locked safe. Files on the computer were password protected and backup was established, with only the researcher having access to it. As soon as the questionnaires and evaluation forms had been filled in, the researcher collected them and sealed them in an envelope for confidentiality.

According to Botma and colleagues. (2010: 19), every potential participant has the right to fair selection that is non-discriminatory, to uphold the *right to fair treatment*. The researcher ensured that there was no discrimination during the selection of the sample for the study, by allowing the potential participants who were available to consent voluntarily to participate in the study.

3.5 STAGES 1-4: RIGOR

Rigor refers to the precision and detail with which research is carried out in order to ensure quality (Grove & Gray, 2018: 11). Gray *et al.* (2016:192) refer to rigor as striving for excellence in research, which demands discipline, adherence to detail and meticulousness. To ensure rigor, data has to be gathered in a methodical, unbiased and thorough manner for further analysis and interpretation in a way that minimises contamination and enhances accuracy of the research (Polit & Beck, 2017: 305).

Rigor was ensured in the four stages of the study. Various criteria were employed to ensure rigor at the different stages of the study. Four criteria were employed to ensure rigor in *Stage 1*. These criteria were *truth value, consistency, neutrality* and *applicability*.

Truth value determines the creation of confidence in the accuracy of the findings regarding the participants and the context in which the research was undertaken (Botma *et al.* 2010: 233). In the first step of *Stage 1*, truth value was ensured by construction of a clear review question, formulated using the PICO format, which is regarded as the gold standard in systematic reviews and used in this case within a systematic search for literature. In Steps 2 and 3, the researcher consulted an experienced librarian for guidance in choosing electronic databases. In addition, two independent reviewers confirmed data obtained through Steps 1 to 3.

Consistency refers to the permanence of data over time, that is, how reproducible the study is in different settings (Polit & Beck, 2017: 585). In this study, in order to ensure consistency, an audit trail kept by the researcher created a platform for other researchers to reproduce the same results.

Applicability refers to the extent to which the findings can be applied to different contexts (Botma *et al*. 2010: 233). In the study, applicability was ensured by using a clear method of selecting articles according to clearly defined inclusion and exclusion criteria. The activities that were identified from the literature search were proven by research to be applicable to different settings.

Neutrality refers to the impartiality of the whole research process and absence of bias in the description of results (Polit & Beck, 2017: 585). In the study, consultation of an experienced librarian ensured that sources from comprehensive and accessible electronic databases were used. Therefore, the activities relating to these electronic databases were objective, thus, eliminating bias to a great extent.

The methodically unbiased manner in which *Stages 2 and 4* were conducted ensured rigor in the study. The researcher was not known to the participants and, therefore, influenced data collection in *Stages 2 and 4* of the study minimally. The researcher ensured that participants completed both the pretest and the posttest. The same questionnaire was used in both *Stages 2 and 4*.

According to Madan, Henderson, Hashtroudi, Hope and Harvey (2013: 220), the posttest and the evaluation of the workshop has to be done immediately after the workshops, to minimise confounding factors on the results as far as possible. In this study, the posttest and the workshop evaluation were done soon after completion of the workshops at the experimental sites at Thaba Nchu PHC clinics.

The researcher used the same workshop programme for *Stage 3* at all experimental sites in Thaba Nchu to ensure *consistency* of results. The researcher was the only facilitator of the interactive diabetes workshops at all the five experimental site PHC clinics.

- Validity of the study

This section will discuss issues relating to measures that were taken to enhance the integrity of the study during *all four stages,* focusing on the validity, reliability and accuracy of the study. Validity refers to the degree to which conclusions made in a study are accurate and well established (Polit & Beck, 2017: 745). Validity can be of two types, internal and external validity (Nkwake, 2015: 101). In the following discussion, internal validity and external validity and how they were ensured in this study will be described.

- Internal validity

Gray *et al.* (2016: 697) define internal validity as the extent to which the effects detected in the study are a true reflection of reality, rather than being the result of effects of extraneous variables. Internal validity is the extent to which the study measures what it set out to measure, excluding selection bias, information bias and confounding bias. In order to minimise bias, the development of the interactive diabetes workshop programme as well as the diabetes-related questionnaire were guided by information from literature. The researcher consulted two independent reviewers to check the credibility of the literature that was used in this study. A pilot study was carried at one of the PHC clinics in Botshabelo to test the questionnaire, Likert scale (Addendum H) and the interactive diabetes workshop programme.

- External validity

External validity refers to the degree to which study results can be generalised (Polit & Beck, 2017: 727). To enhance external validity, the researcher meticulously followed the steps of the research design in all four stages of the study, to ensure that generalisable results were obtained.

- Instrument validity

A pilot study of the data collection tools, Likert scale (Addendum H) and questionnaire (Addendum G) were carried out. The pilot study was done to determine the time it would take to complete the questionnaire and the Likert scale, and to identify questions that were not clear, hence, establish the content validity of the questionnaire. Content validity of a questionnaire refers to the level of appropriateness of the questions and extent to which they address the concept under study (Polit & Beck, 2017: 336). Two independent reviewers reviewed the data collection tools for their validity.

- Reliability

Reliability is defined as the degree of consistency with which a method measures a phenomenon in different contexts (Heale & Twycross, 2015: 66). A pilot study of both the questionnaire and the interactive diabetes workshops was carried out to determine the reliability of both the questionnaire and the interactive diabetes workshop programme in Stages 2, 3 and 4.

The researcher conducting the interactive diabetes workshops using the same programme and questionnaires at the different experimental sites ensured reliability.

3.6 CONCLUSION

In this chapter, a discussion of the research methodology of the study was given. The chapter highlighted the research design that was used in the study. Aspects of the population, sampling and data collection and methods of data analysis of each of the four phases were discussed. The analysed data will be reflected in Chapter 4.

CHAPTER 4:
RESULTS

4.1 INTRODUCTION

The aim of this study was to describe the feasibility of interactive diabetes workshops for PHC nurses in a Free State sub-district. The study had four objectives, which culminated in the four stages of the study. The objectives of the study were:

1) To develop an interactive workshop programme according to previously identified, key diabetes-related messages using a literature search – Stage 1;
2) To determine diabetes-related knowledge by means of a pretest diabetes questionnaire – Stage 2;
3) To facilitate interactive workshops and assess the feasibility of interactive diabetes workshops for PHC nurses post the interactive workshops, by means of a Likert scale – Stage 3; and
4) To determine diabetes-related knowledge by means of a posttest diabetes questionnaire – Stage 4.

In this chapter, results will be presented according to these four objectives.

4.2 OBJECTIVE 1: DEVELOP AN INTERACTIVE WORKSHOP PROGRAMME ACCORDING TO PREVIOUSLY IDENTIFIED, KEY DIABETES-RELATED MESSAGES IN STAGE 1 OF THE STUDY

Literature on the management of diabetes using the six key diabetes-related messages (Reid *et al.* 2018: 122-131), as well as on the development and implementation of interactive workshops, was sought via different databases.

Fifteen electronic databases were used for the literature search. A summary of the databases that were consulted for the literature search and the number of abstracts they

provided are presented in Table 4.1. The first three steps in the systematic review process as recommended by Higgins and Green (2011: online) were followed in the systematic search for literature to retrieve the abstracts.

Table 4.1: Electronic data sources and abstracts obtained

Database	Number of abstracts found
CINAHL with Full Text	160
MEDLINE with Full Text	156
Academic Search Complete	91
PsycINFO	74
Health Source: Nursing/Academic Edition	30
ERIC	18
Africa-Wide Information	16
CAB Abstracts	12
SocINDEX with Full Text	11
MasterFILE Premier	7
American Doctoral Dissertations	5
Business Source Complete	4
PsycARTICLES	3
Communication & Mass Media Complete	1
EconLit with Full Text	1

4.2.1 Step 3: Search for articles

In order to retrieve abstracts from the databases, search words to be used in the search string were constructed from the research topic. Table 4.2 shows the search words used in the search string. Figure 4.1 shows the literature search process followed in the study and the process of filtering articles. A relatively large sample (n=345 abstracts) was generated. The abstracts were filtered against inclusion and exclusion criteria by the researcher and two systematic review experts; as a result, 315 abstracts were excluded from the sample by the researcher. The 315 abstracts that were excluded included those that had irrelevant titles (n=309) and duplicate abstracts (n=6). The remaining 30 abstracts were filtered against the inclusion and exclusion criteria (Section 3.3.1.1); 14 abstracts were excluded for failing to meet the inclusion criteria. The researcher verified the filtering process with two systematic research experts.

Table 4.2: Search words used in the search string

First set	Second set	Third set
((nurs* or “healthcare worker*” or “health care worker*” or carer* or caregiver* or “care giver*” or “healthcare provider*” or “health care provider*” or “healthcare professional*” or “health care professional*” or doctor* or physician* or “general practitioner*” or “family practitioner*”)) not (patient* or “nursing home*” or doctoral*)	(interact* or collaborat* or group*) n3 (workshop* or discus* or dialog* or engag* or outreach* or platform* or train* or educat* or session* or activit* or program* or interven*)	ti ((interact* or collaborat* or group*) n3 (workshop* or discus* or dialog* or engag* or outreach* or platform* or train* or educat* or session* or activit* or program* or interven*) and (nurs* or “healthcare worker*” or “health care worker*” or carer* or caregiver* or “care giver*” or “healthcare provider*” or “health care provider*” or “healthcare professional*” or “health care professional*” or doctor* or physician* or “general practitioner*” or “family practitioner*”))

Full articles for the 16 abstracts that met the inclusion and exclusion criteria were read to ensure that the content of the articles truly reflected the identified inclusion/exclusion criteria – 10 articles met the inclusion criteria. The other six were excluded because they did not meet the inclusion criteria. The 10 articles were then used to select the activities that were employed in the interactive workshops.

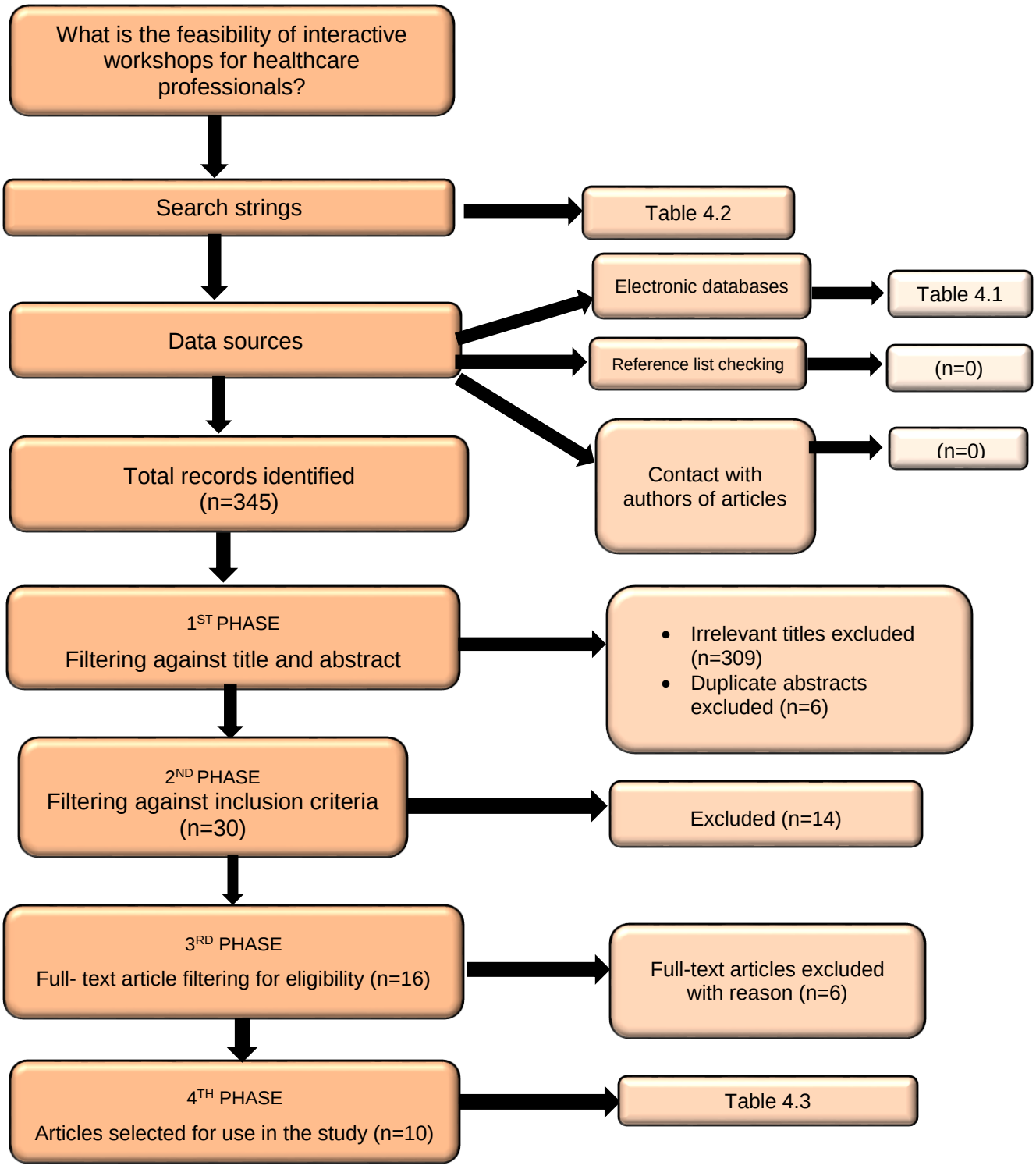

Figure 4. 1: Literature search process followed in the study and the process of filtering articles

4.2.2 Summary of articles identified

The following is a summary of the 10 articles that were identified using the first three steps of the systematic review process. These articles report on different interactive activities that were used in workshops for training health professionals. The 10 articles are presented in Table 4.3.

Table 4.3: Summary of the articles (n=10) that met the inclusion criteria

ARTICLE TITLE	DESIGN USED	TYPES OF INTERACTIVE ACTIVITIES USED	ROLE PLAYERS	CONTENT COVERED	FEASIBILITY	DURATION OF INTERACTION
Elliott, C., Creighton, S.M., Barker, M.J. & Liao, L.M. 2016. A brief interactive training for health care professionals working with people affected by "female genital mutilation": Initial pilot evaluation with psychosexual therapists. *Sexual and Relationship Therapy*, 31(1), pp. 70-82.	The design used was not mentioned.	Small-group discussions Videos Slide shows Case studies	A consultant clinical psychologist and women's health specialist, together with an assistant psychologist, co-facilitated the training workshops 49 psychosexual therapists participated There were 12-16 participants per workshop	Female genital mutilation (types, associated physical and mental problems)	Knowledge of female genital mutilation increased by 52%, from 29% before the workshop to 81% after the workshop Rating of participants: Excellent (68%) Good (38%)	90-minute workshops, which were repeated at four separate events during the two-day conference

ARTICLE TITLE	DESIGN USED	TYPES OF INTERACTIVE ACTIVITIES USED	ROLE PLAYERS	CONTENT COVERED	FEASIBILITY	DURATION OF INTERACTION
Choi, Y. & Won, M. 2013. A pilot study on effects of a group program using recreational therapy to improve interpersonal relationships for undergraduate nursing students. *Archives of Psychiatric Nursing*, 27(1), pp. 54-55.	Pretest-posttest single group design	Games Role playing Group discussions	The two researchers of the article co-facilitated the training workshops 19 nursing students were participants	Interpersonal relationships Trust and empathy	Interpersonal relationship score increased from 90.7% before the group programme, to 95.8% Rating of the workshop by participants: Very satisfied (73.7%) Satisfied (26.3%)	The workshops lasted for 90 minutes. There were 3 sessions
Brown C.R., Johnson A.S. & Appling S.E. 2011. A taste of nursing research: an interactive program introducing	Quasi-experimental pretest-posttest design	Poster presentations Small-group discussions	The three authors of the article were the facilitators of the workshop 111 nurses participated	How to develop a research question Steps to be followed when	The percentage of participants who would initiate a nursing research project increased by 8%, from 26% before to 34%	The programme was implemented in a day

ARTICLE TITLE	DESIGN USED	TYPES OF INTERACTIVE ACTIVITIES USED	ROLE PLAYERS	CONTENT COVERED	FEASIBILITY	DURATION OF INTERACTION
evidence-based practice and research to clinical nurses. *Journal For Nurses In Staff Development*, 27(6), pp. E1-5.		Putting into practice what had been learnt		developing a research study	after the intervention Participants did not rate the workshop	
Chiang H., Lin F. & Hwu Y. 2013. Disability assessment: the efficacy of multimedia interactive nurse education. *The Journal of Nursing Research*, 21(2), pp. 83-93.	Quasi-experimental design	Multimedia interactive DVD Case study assessment	Three senior nurses (the authors of the article) facilitated the training 62 nurses as participants; 30 were in the experimental group and 32 were in the control group	Methods of carrying out a disability assessment on patients	Knowledge of disability assessment of the experimental group improved from 93.9% before to 95.9% after the intervention Rating by participants: All (100%) the participants rated the multi-media	Actual time spent is not mentioned

ARTICLE TITLE	DESIGN USED	TYPES OF INTERACTIVE ACTIVITIES USED	ROLE PLAYERS	CONTENT COVERED	FEASIBILITY	DURATION OF INTERACTION
					interactive DVD as a method that positively facilitated learning outcomes, and enhanced learning time, flexibility, autonomy and convenience	
Mohamadkhani, S.E., Alipor, A. & Hasanzadeh, P.S. 2013. Effect of cognitive therapy training in groups on health anxiety among nursing students. *Journal of Jahrom,* 11(2) pp. 52-60	Quasi-experimental design	No activities were mentioned	Three psychologists were the facilitators of the training 30 nursing students	Cognitive therapy was conducted in sessions, which covered: • Familiari-sation with ABC model • Relaxation training • Identification of superficial thoughts and processes	Mean health anxiety scores decreased, from 23.9% to 15.6% in the experimental group Participants did not rate the workshop	The workshops lasted for 90 minutes 12 sessions were facilitated

ARTICLE TITLE	DESIGN USED	TYPES OF INTERACTIVE ACTIVITIES USED	ROLE PLAYERS	CONTENT COVERED	FEASIBILITY	DURATION OF INTERACTION
				• Conceptual-isation of beliefs • Behaviour change and planning to change own behaviour		
Wu, C., Lin, Y., Yeh, M.C., Huang, L., Chen, S., Liao, S. & Lee, M. 2014. Effectiveness of interactive discussion group in suicide risk assessment among general nurses in Taiwan: a randomized controlled trial. *Nurse Education,*	Pretest-posttest experimental design	Two case scenarios Group discussions	Two nurses and two psychiatrists were the facilitators of the training 216 nurses were participants	Suicidal risk assessment using the Chinese SAD PERSONS Scale	The mean scores for the abilities of the nurses to identify and assess suicide risk increased from 8.3% before to 10.9% after the intervention The participants did not rate the workshop	The workshops lasted for 2½ hours. There were two sessions

ARTICLE TITLE	DESIGN USED	TYPES OF INTERACTIVE ACTIVITIES USED	ROLE PLAYERS	CONTENT COVERED	FEASIBILITY	DURATION OF INTERACTION
34(11), pp. 1388-94.						
Schaubhut, R. M. & Gentry, J. A. 2010. Nursing preceptor workshops: Partnership and collaboration between academia and practice. *The Journal of Continuing Education in Nursing*, 41(4), pp. 155-160.	The design was not described	PowerPoint slides Video case studies Small-group discussions	Two clinical nurses were the facilitators of the workshops 130 nurses were participants	Clinical teaching strategies Adult learning theories Strategies for evaluating students in the clinical setting	No statistical evidence was outlined in the article. However, an increase in interest in pursuing a career in nurse education was reported At the end of the workshop, there was knowledge enhancement on how to be an effective preceptor; there was a positive change in skills and attitudes;	The program took four hours

ARTICLE TITLE	DESIGN USED	TYPES OF INTERACTIVE ACTIVITIES USED	ROLE PLAYERS	CONTENT COVERED	FEASIBILITY	DURATION OF INTERACTION
					and positive change in performance Participants did not rate the workshop	
Rosenkranz, S., Abbott, P., Reath, J., Gunasekera, H. & Hu, W. 2012. Promoting diagnostic accuracy in general practitioner management of otitis media in children: findings from a multimodal, interactive workshop on tympanometry and pneumatic otoscopy.	The design was not mentioned	Online training resource Expert presentations and demon-strations Hands-on experience in tympanometry Videos Didactic presentations	An ear, nose and throat surgeon, a paediatrician and an audiologist were the workshop facilitators 23 general practitioners were participants	Information on otitis media in children; diagnosis of otitis media, best practice guidelines and evidence based treatment of otitis media Pneumatic otoscopy skills Tympanometry skills	The mean scores for the confidence of the practitioners in using tympanometry were enhanced from 3.3% before to 5.0% after the intervention Mean scores for the confidence of the practitioners in diagnosing otitis media with effusion were	The workshop was three hours long There was one session

ARTICLE TITLE	DESIGN USED	TYPES OF INTERACTIVE ACTIVITIES USED	ROLE PLAYERS	CONTENT COVERED	FEASIBILITY	DURATION OF INTERACTION
Quality in Primary Care. 20(4), pp. 275-285		with exemplary videos Role playing with reflections			enhanced from 4.5% before to 4.9% after the intervention Participants did not rate the workshop	
Zaider, T.I., Banerjee, S.C., Manna, R., Coyle, N., Pehrson, C., Hammonds, S.; Krueger, C.A. & Bylund, C.L. 2016. Responding to challenging interactions with families: A training module for inpatient oncology nurses.	Design was not described	Videos Role playing Discussions	Five of the article authors were the facilitators of the training 282 bedside nurses were participants	Strategies to be used by nurses when partnering with families under stressful circumstances	Participants had increased confidence in dealing with families, evidenced by increased mean scores, from 3.3% before to 3.9% after the intervention Participant ratings: effectiveness of the group	One hour 45 minutes per group of participants 26 sessions were held

ARTICLE TITLE	DESIGN USED	TYPES OF INTERACTIVE ACTIVITIES USED	ROLE PLAYERS	CONTENT COVERED	FEASIBILITY	DURATION OF INTERACTION
Families, Systems, & Health, 34(3), pp. 204-212.					facilitator (87.9%)	
AlReshidi, N.M. 2016. *The impact of an interactive educational programme on children's nurses' knowledge, attitudes, beliefs and perceptions of children's pain, self-efficacy, and perceptions of barriers to optimal post-operative pain management in children*. PhD Thesis.	A non-equivalent groups pretest posttest design	Exercises Videos Self-check games	The researcher was the developer of the online programme 229 nurses were participants	Post-operative paediatric pain management Paediatric nurses' perception of pain	The mean scores of knowledge and attitudes of the nurses towards children's pain increased from 20% before to 34.3% after the intervention Participants did not rate the workshop	Time is not mentioned

ARTICLE TITLE	DESIGN USED	TYPES OF INTERACTIVE ACTIVITIES USED	ROLE PLAYERS	CONTENT COVERED	FEASIBILITY	DURATION OF INTERACTION
University of Salford.						

In the article by Elliott and colleagues (2016: 72), titled, *A brief interactive training for health care professionals by working with people affected by "female genital mutilation": initial pilot evaluation with psychosexual therapists*, the research design used is not mentioned. The interactive activities in the workshop were small-group discussions, videos, slide shows and case articles. A consultant clinical psychologist, a women's health specialist, an assistant psychologist clinical psychologist and an assistant psychologist facilitated the workshops. Forty-nine (n=49) psychosexual therapists participated in the workshops, which were attended by 12-16 participants in each of four workshops. The content covered in the workshops related to female genital mutilation types and their associated physical and mental problems. The results obtained show that the interactive workshops were successful, with knowledge of female genital mutilation increasing by 52%, from 29% before the workshop, to 81% after the workshop. The participants rated the workshop as excellent (68%) or good (38%). The duration of each workshop was 90 minutes, and the workshop was repeated at four separate events during a two-day conference.

Choi and Won (2013: 54), in their article, titled, *A pilot study on effects of a group program using recreational therapy to improve interpersonal relationships for undergraduate nursing students,* used a pretest-posttest single group design to establish the effects of interactive workshops on interpersonal relationships. The interactive activities used in the workshops were games, role playing and group discussions. The two researchers of the article co-facilitated the three training workshops, with 19 nursing students as participants. The workshops were on interpersonal relationships, trust and empathy. Results show that there was an increase in the scores of interpersonal relationships among the participants. Interpersonal relationships scores increased from 90.7% before the interactive workshop to 95.8% after the workshop. Participants rated their response to the workshops as either very satisfied (73.7%) or satisfied (26.3%). The three workshops lasted 90 minutes each.

Brown, Johnson and Appling (2011: E2), in their article, titled, *A taste of nursing research: An interactive program introducing evidence-based practice and research to clinical*

nurses, used a quasi-experimental pretest-posttest design to introduce evidence-based practice and research to clinical nurses. The interactive activities used in the workshops were poster presentations, small-group discussions and putting into practice what had been learnt. The three researchers of the article facilitated the workshop, which was attended by 111 nurses. The interactive workshop was on development of a research question and steps to be followed when developing a research study. The percentage of participants who would initiate a nursing research project increased by 8%, from 26% before to 34% after the intervention. There were no ratings of the workshop by the participants. The workshop was implemented in a day.

Chiang, Lin and Hwu (2013: 85), in their article titled, *Disability assessment: The efficacy of multimedia interactive nurse education,* used a quasi-experimental design. The interactive activities during the workshop were a multimedia interactive DVD and a case study assessment. Three senior nurses who were the researchers in the article facilitated the training, with 62 nurses as participants. The content of the workshop comprised methods of carrying out a disability assessment on patients. Knowledge of disability assessment of the experimental group improved, from 93.9% before to 95.9% after the intervention. All the participants (100%) rated the multimedia interactive DVD as a method that positively facilitated learning outcomes and enhanced learning time flexibility, autonomy and convenience. However, the duration of the workshop was not mentioned.

Mohamadkhani, Alipor and Hasanzadeh (2013:55), in their article titled, *Effect of cognitive therapy training in groups on health anxiety among nursing students,* used a quasi-experimental design. However, the specific interactive activities that were used in the workshops were not mentioned. Three psychologists facilitated the 12 interactive workshops with 30 nursing students as participants. The content of the workshop involved cognitive therapy, which was divided into familiarisation with the ABC model; relaxation training; identification of superficial thoughts and processes; conceptualisation of beliefs; behaviour change; and planning to change own behaviour. At the end of the interactive workshops, the mean health anxiety scores had decreased from 23.9% to 15.6% in the

experimental group. There were no ratings of the workshop by the participants. The workshops lasted 90 minutes.

Wu, Lin, Yeh, Huang, Chen, Liao and Lee (2014:1391) wrote an article titled, *Effectiveness of interactive discussion group in suicide risk assessment among general nurses in Taiwan: A randomized controlled trial*, which was carried out using a pretest-posttest design. The interactive activities used were two case scenarios and group discussions. Two nurses and two psychiatrists facilitated the two interactive workshops, which were attended by 216 nurses as participants. The content of the workshops was suicide risk assessment using the Chinese SAD PERSONS Scale. The mean scores for the abilities of the nurses to identify and assess suicide risk increased from 8.3% before the intervention to 10.9% after the intervention. The participants did not rate the workshop. The workshops lasted for two and a half hours.

Schaubhut and Gentry (2010:157), in their article titled, *Nursing preceptor workshops: partnership and collaboration between academia and practice*, used interactive workshops to enhance nurse preceptorship. The research design used in the study was not mentioned. The interactive activities used were PowerPoint slides, video case articles and small-group discussions. Nurse educators facilitated the workshops for 130 nurses as participants in the workshops. The content covered clinical teaching strategies, adult learning theories and strategies for evaluating students in the clinical setting. No statistical evidence was outlined in the article. However, an increase in the interest of nurses in pursuing a career in nurse education was reported. At the end of the workshop, there was knowledge enhancement on how to be an effective preceptor, a positive change in skills and attitudes and a positive change in performance. There were no participant ratings of the workshops. The workshop was facilitated in four hours.

Rosenkranz, Abbott, Reath, Gunasekera and Hu (2012:277), in their article titled, *Promoting diagnostic accuracy in general practitioner management of otitis media in children: findings from a multimodal, interactive workshop on tympanometry and pneumatic otoscopy,* discuss interactive workshops that were used to train general

practitioners to manage otitis media in children. The research design used was not mentioned. The interactive activities employed were an online training resource; expert presentations and demonstrations; videos; hands-on experience in tympanometry; didactic presentation with exemplary videos; and role playing with reflections. An ear, nose and throat surgeon, a paediatrician and an audiologist facilitated the workshop. Participants in the workshop were 23 general practitioners. The content delivered was information on otitis media in children, which included diagnosis of otitis media and best practice guidelines, and evidence-based treatment of otitis media, pneumatic otoscopy skills and tympanometry skills. The mean scores for the confidence of the practitioners to use tympanometry were enhanced, from 3.3% before to 5.0% after the intervention. The mean scores for the confidence of the practitioners in diagnosing otitis media with effusion were enhanced from 4.5% before to 4.9% after the intervention. There were no participant ratings of the workshop. The workshop was three hours long.

Zaider and colleagues (2016: 208), in their article titled, *Responding to challenging interactions with families: A training module for inpatient oncology nurses,* discuss the interactive workshops used to train inpatient oncology nurses on how to respond to challenges they face when interacting with families. The research design used was not mentioned. The interactive activities that were used were videos, role-play and discussions. Five of the researchers facilitated the workshops for 282 inpatient oncology nurses. The content of the workshop comprised strategies nurses could apply when collaborating with families under stressful circumstances. There was increase in confidence of participants in dealing with families, evidenced by increased mean scores, from 3.3% before to 3.9% after the intervention. Participants rated the effectiveness of the group facilitator as 87.9%. The duration of the workshops was one hour 45 minutes per group of participants.

AlReshidi (2016:76), in a thesis titled, *The impact of an interactive educational programme on children's nurses' knowledge, attitudes, beliefs and perceptions of children's pain, self-efficacy, and perceptions of barriers to optimal post-operative pain*

management in children, describes the use of interactive activities for training nurses to manage postoperative pain in children. In the article, a non-equivalent group's pretest-posttest design was used. The interactive activities used included exercises, videos and self-check games. In total, 229 nurses were trained using an online interactive educational programme on DVD, which had been developed by the researcher. The content of the programme included postoperative paediatric pain management and paediatric perception of pain. The mean scores for knowledge and attitudes of nurses towards children's pain increased from 20% before the intervention to 34.4% after the intervention. Participants did not rate the workshop. The duration of the workshop was not mentioned.

4.2.3 Development of the interactive diabetes workshop

Activities that had to be used in the interactive workshops of this study were selected from the 10 articles identified after the systematic search of literature using the first three steps of a systematic review. Kagan strategies (Kagan, 2007: online) were added to the selected articles after the researcher had gained exposure to this interactive learning training. It is unclear why the systematic literature search failed to uncover evidence of Kagan strategies. However, the researcher identified this interactive technique during her own literature search, and the applicability of this technique necessitated its inclusion in the study. The interactive activities that were used to facilitate the interactive workshops in the 10 articles are small-group discussions, videos, case studies, games, role playing, putting into practice what had been learnt, multimedia interactive video, self-check games, exercises, Kagan's rally coach, timed pair share and rally robin. However, not all these interactive activities could be used in the interactive diabetes studies, because of the different contexts in which the studies in the identified 10 publications took place. Practicality of using the activities had to be assessed initially, to determine the choice of activities that were finally selected to be incorporated in the diabetes workshops. The assessment revealed that the PHC clinics that were selected to be the experimental sites

had limited space for the facilitation of the interactive diabetes workshops, and no electronic facilities to accommodate videos or PowerPoint slides. In addition, the numbers of nurses in these PHC clinics were small, with an average of four nurses per clinic. As a result, the duration of the interactive workshops had to be short, to allow the nurses to get back to work. Therefore, the choice of interactive activities had to accommodate the absence of electronic equipment, limited space for facilitation, and the limited time the nurses could be away from their work to participate in the workshops. The interactive activities that were selected for use in the workshop to convey the different key diabetes messages were small-group discussions, role playing, case scenarios, Kagan's rally coach, timed pair share and rally robin. Table 4.4 depicts the six key diabetes messages that constituted the contents of the interactive workshop and the interactive activities used.

Table 4.4: Six key diabetes messages that constituted the contents of the interactive diabetes workshop and the interactive activities used

Key diabetes message addressed	Type of interactive activity (Duration)	Motivation for choosing the interactive activity
Diabetics should eat small, regular meals	Small-group discussions (Elliot *et al.*, 2016: 72) Kagan's round robin (Clowes, 2011: online) (10 minutes)	Small-group discussions were used for this key diabetes message, because participants had the opportunity to share their opinions on what they considered to be the meals of people with diabetes; they drew on flip charts the constituents of a diabetic meal. The discussions enhanced their own knowledge related to diabetic diet, and their skills and confidence in teaching their diabetic clients about diabetic meals.
Diabetics should aim to walk fast at least 30 minutes most days	Role playing, group discussions (Choi & Won, 2013: 56) and Kagan's rally coach (Clowes, 2011: online). (5 minutes)	Participants had to walk to the beat of music at different tempos while others, who watched, acted as the judges of the different walks. This is the rally coach strategy. Since role playing provides a safe environment to learn and make mistakes, the participants were free to walk to the different tempos of music. The discussions that followed allowed the participants to verbalise why they chose their particular tempo, thus, enhancing their skills of communication.
Diabetics should lose weight as prescribed.	Case scenario, discussions (Wu *et al.*, 2014: 1390) and Kagan's timed pair share (Clowes, 2011: online). (5 minutes)	Participants solved the case scenario provided in a timed pair share, which is an activity where partners, as a pair, take turns to share with their colleague within a timed period how they would solve the scenario problem, while the colleague listens. Participants had opportunities to calculate BMI. In addition, using the provided information on the normal ranges of waist circumference, they determined if the patient in the scenario was obese. The discussions

Key diabetes message addressed	Type of interactive activity (Duration)	Motivation for choosing the interactive activity
		enhanced the critical thinking of participants, their communication skills and confidence in calculating BMI correctly.
Diabetes can be controlled and complications prevented	Case scenario, small-group discussions (Schaubhut & Gentry, 2010:156) and Kagan's rally robin (Clowes, 2011: online). (5 minutes)	A case scenario of the key diabetes message allowed the participants to explain their different views on how complications of diabetes can be controlled. Participants used the rally robin strategy, where they turned to their partner and took turns generating ideas on how to solve the problem. As they solved the scenario, their teamwork skills and critical thinking were enhanced. Discussions also enhanced retention of information.
Medication must be taken as prescribed	Case scenario, small-group discussions (Wu *et al*., 2014: 1390) and Kagan's rally robin (Clowes, 2011: online). (5 minutes)	The case scenario exposed the participants to a real-life situation, which stimulated how nurses have to encourage clients to adhere to the correct administration of medications. As the participants discussed, the rally robin strategy was used, which involves participants turning to their partner and taking turns generating ideas on how to solve the problem. The discussions encouraged better information retention.
Diabetics can enjoy a normal life	Case scenario, small-group discussions (Schaubhut & Gentry 2010: 156) and Kagan's rally robin (Kagan, 2007: online). (5 minutes)	Solving the scenario encouraged participants to come up with alternatives to counsel a diabetic man to help him accept his condition and lead a normal life. The activities permitted participants to volunteer suggestions and defend their viewpoints with confidence. Ultimately, problem-solving skills and confidence of participants were enhanced.

In order to address the first key diabetes message, *diabetics should eat small, regular meals*, small-group discussions were used (Elliot *et al.* 2016: 72). Participants were allocated to groups of two, where they discussed and represented diagrammatically on a flip chart the food that should constitute a diabetic meal. The discussions were aligned to the Kagan strategy called the round robin (Clowes, 2011: online). The activity lasted 10 minutes.

The second key diabetes message, d*iabetics should aim to walk fast at least 30 minutes most days,* was facilitated by playing music of different tempos. In groups of two, participants had to role-play how to walk fast by marching to the beat of different types of music that was played (Zaider e*t al*. 2016: 208). They then helped each other to identify the fast walk according to the guidelines in the handout that had been distributed to them. The Kagan strategy that was employed in this activity is the rally coach (Clowes, 2011: online). The rally coach involves participants taking turns to solve a problem while the others assume the roles of coaches of the given task. The activity took five minutes to complete.

A case scenario was used to facilitate the third key diabetes message, *diabetics should lose weight as prescribed.* The solving of case scenarios enhances critical thinking abilities (Wu *et al*. 2014: 1389). Participants were given a case scenario to solve, which related of weight management of a diabetes patient according to their waist circumference, weight and height. In groups of two, the participants referred to the handout on recommended waist circumferences and engaged in discussions on waist circumference monitoring. In addition, they had to calculate the BMI of the patient in the scenario, to make decisions on how to manage the patient's weight. The discussions followed the Kagan strategy of timed pair share (Clowes, 2011: online), which involves partners in a pair taking turns to share with their colleague within a timed period how they would solve the scenario problem, while the colleague listens. The groups shared their responses in the bigger group. Participants took five minutes to complete the activity.

Facilitation of the fourth and fifth key diabetes messages, *diabetes can be controlled and complications prevented,* and *medication must be taken as prescribed,* was done using one case scenario. Participants were allocated into groups of two, where they had to solve the scenario of a diabetes patient with a non-healing ulcer on the big toe, and who does not understand the importance of taking medication as prescribed; is always hungry and thirsty; has a fruity breath; has confusion and frequent urination. Participants engaged in discussions to solve the scenario. They used the rally robin strategy, where participants turned to their partner and took turns generating ideas on how to solve the problem. According to Wu *et al*. (2014: 1389), solving case scenarios by encouraging participants to engage in discussions, enhances critical thinking skills. Participants were given 10 minutes to complete the task.

In facilitating the sixth key diabetes message, *diabetics can enjoy a normal life; a* case scenario was presented to participants to solve (Elliot *et al*. 2016:74). In the scenario, a diabetic man with fears of sexual impotence, stigmatisation and failure to support his family was presented. In groups of two, participants discussed how they would assist the man to lead a normal life. The Kagan strategy of rally robin (Clowes, 2011: online) was used in the interactions, which lasted five minutes.

4.3 OBJECTIVES 2 AND 4: DETERMINE DIABETES-RELATED KNOWLEDGE BY MEANS OF A PRETEST AND POSTTEST DIABETES QUESTIONNAIRE IN STAGES 2 AND 4 OF THE STUDY

Results of the diabetes-related knowledge that was obtained from the pretest and posttest will be presented in this section. Data on the diabetes-related knowledge was collected using a structured questionnaire (Addendum G). Participants in both the experimental and control groups completed these structured questionnaires.

4.3.1 Demographic data of participants

Table 4.5 displays the demographic data of participants in both the experimental and control groups. The total sample size for both the experimental and control groups was 42, with 21 participants in each group.

Table 4.5: Demographic data of study participants

Demographic variable		Experimental (n=21) Frequency (%)	Control (n=21) Frequency (%)
Gender	Female	18 (85.7%)	18 (85.7%)
	Male	3 (14.3%)	3 (14.3%)
Age (in years)	20-50	4 (19%)	5 (23.8%)
	51-70	17(80.9%)	16 (76.2%)
Education	Certificate	5 (23.8%)	8 (38.1%)
	Diploma	11 (52.4%)	10 (47.6%)
	B degree	5 (23.8%)	3 (14.3%)
Employment position	Registered nurse	14 (66.7%)	11 (52.4%)
	Enrolled nurse	4 (19%)	2 (9.5%)
	Auxiliary nurse	3 (14.3%)	8 (38.1%)

The number of participants in the 20-50 years age group for the experimental and control groups was similar (19% and 23.8% respectively). The same was true for the 51-70 years age group, with 80.9% and 76.2% of the participants in the two groups respectively falling in this age group. According to the South African Nursing Council (SANC, 2018a: 1-4), the 20-50 years age group has 53% of all registered nurses, while the 51-70 years age group has 47% of all the country's registered nurses.

There are more female registered nurses (7 020) than male nurses (1 162) in the Free State (SANC, 2018b: 1). These figures correspond with the findings of the study, which found that 18 (86%) of the participants in both the experimental and control groups were women and three (14%) were men. These findings are aligned to the fact that the nursing profession is predominantly female (Shen-Miller & Smiler, 2015: 270).

The academic profiles of registered nurses in South Africa include degree-qualified nurses and diploma-qualified nurses. However, the number of degree-qualified nurses is lower than that of diploma-qualified nurses. The government of South Africa plans to increase the numbers of lower cadre nurses and diploma-qualified nurses, in order to solve the problem of low numbers of health professionals (Roets, Botma & Grobler, 2016: 424). The numbers of degree-qualified nurses in both the experimental and control group (23.8% and 14.2%) were lower than the numbers of diploma-qualified nurses in the experimental and control group (52.4% and 47.6% respectively).

The employment positions of the participants were registered nurses, enrolled nurses and auxiliary nurses. According to the SANC (2018b: 2), the numbers of registered nurses (76 770) with the South African Nursing Council are greater than the numbers of enrolled nurses (67 415) and auxiliary nurses (64 284). This corresponds with the statistics of nurses in this study, with the numbers of registered nurses in both the experimental and control groups being greater than both the enrolled and auxiliary nurses, as shown in Table 4.5.

4.3.2 Participant responses to questions on key diabetes messages in experimental and control groups, and related p values

The responses of participants to questions on the six key diabetes messages in the experimental and control groups and their related p values will be discussed in this section. The same questionnaire (Addendum G) was used for both the experimental and control groups. The questionnaire had 12 questions that were spread to cover the six key diabetes messages. In Table 4.6, the correct responses to questions are highlighted in

bold. Responses of participants are depicted in frequency and percentages for experimental and control groups. Related p values are also reflected.

Table 4.6: Participant responses to questions on key diabetes messages in control and experimental groups with related p values

	Control (n=21)						Experimental (n=21)						Changes from pre- to posttest		
													Statistical test used		
													McNemar's test		Fisher's exact test/Chi-square
Question (Key diabetes message)	**Pre-test phase Frequency (%)**			**Post-test phase Frequency (%)**			**Pre-test phase Frequency (%)**			**Post-test phase Frequency (%)**			p value within control group	p value within experi-mental group	p values across control and experi-mental groups
	True	False	Unsure	True	False	Unsure	True	False	Unsure	True	False	Unsure			
1. In order to avoid foot ulcers, people with diabetes should wear shoes with pointed tips (Diabetes can be controlled	1 (4.8%)	**20 (95.2%)**	0	2 (9.5%)	**18 (85.7%)**	1 (4.8%)	1 (4.8%)	**20 (95.2%)**	0	2 (9.5%)	**19 (90.5%)**	0	0.59	0.32	1.0

and complications prevented)															
2. People with diabetes need regular eye check-ups to prevent or delay onset of diabetic retinopathy (Diabetes can be controlled and complications prevented)	**19 (90.5%)**	2 (9.5%)	0	**20 (95.2%)**	1 (4.8%)	0	**20 (95.2%)**	0	1 (4.8%)	**21 (100%)**	0	0	0.56	0.47	0.49
3. Brisk walking daily for 30 minutes is good for lowering blood glucose levels (Diabetics should aim to walk fast for at least 30 minutes most days)	**17 (80.9%)**	1 (4.8%)	3 (14.3%)	**17 (80.9%)**	1 (4.8%)	3 (14.3%)	**20 (95.2%)**	0	1 (4.8%)	**21 (100%)**	0	0	1.00	0.47	0.23
4. Exercise increases glucose	**7 (33.3%)**	6 (28.6%)	8 (38.1%)	**12 (57.1%)**	3 (14.3%)	6 (28.6%)	**12 (57.1%)**	5 (23.8%)	4 (19.1%)	**16 (76.2%)**	5 (23.8%)	0	0.17	0.18	1.0

uptake by the muscles and insulin sensitivity ***(Diabetics should aim to walk fast for at least 30 minutes most days)***															
5. *Weight loss in obese diabetes patients can improve blood glucose levels* ***(Diabetics should lose weight as prescribed)***	**20 (95.2%)**	1 (4.8%)	0	**18 (85.7%)**	3 (14.3%)	0	**15 (71.4%)**	4 (19.1%)	2 (9.5%)	**20 (95.2%)**	1 (4.8%)	0	0.32	0.21	1.0
6. Poor control of blood glucose can lead to loss of sensation in the periphery ***(Diabetes can be controlled and complicatio***	**17 (80.9%)**	3 (14.3%)	1 (4.8%)	**18 (85.7%)**	2 (9.5%)	1 (4.8%)	**13 (61.9%)**	6 (28.6%)	2 (9.5%)	**20 (95.2%)**	0	1 (4.8%)	0.95	0.03*	1.0

ns pre-vented)															
7. Meals for people with diabetes should be small and frequent ***(Diabetics should eat small, regular meals)***	**21 (100%)**	0	0	**18 (85.7%)**	1 (4.8%)	2 (9.5%)	**20 (95.2%)**	1 (4.8%)	0	**21 (100%)**	0	0	0.38	0.47	1.0
8. People with diabetes should eat unrefined carbo-hydrates like whole wheat grains, vegetables and fruits ***(Diabetics should eat small, regular meals)***	**21 (100%)**	0	0	**18 (85.7%)**	1 (4.8%)	2 (9.5%)	**20 (95.2%)**	1 (4.8%)	0	**20 (95.2%)**	1 (4.8%)	0	0.38	1.00	1.0
9. Insulin is the first line drug of choice in Type 2 diabetes ***(Medi. cations***	8 (38.1%)	**10 (47.6%)**	3 (14.3%)	5 (23.8%)	**12 (57.1%)**	4 (19.1%)	17 (80.9%)	**3 (14.3%)**	1 (4.8%)	5 (23.8%)	**12 (57.1%)**	4 (19.1%)	0.26	0.07	0.04*

must be taken as prescribed)															
10. ***Insulin administered in an overused site will be absorbed faster*** ***(Medications must be taken as prescribed)***	4 (19.1%)	**13 (61.9%)**	4 (19.1%)	5 (23.8%)	**10 (47.6%)**	6 (28.6%)	5 (23.8%)	**9 (42.9%)**	7 (33.3%)	10 (47.6%)	**9 (42.9%)**	2 (9.5%)	0.80	0.17	1.0
11. ***Depression is common in patients with diabetes*** ***(Diabetics can enjoy a normal life)***	**16 (76.2%)**	3 (14.3%)	2 (9.5%)	**15 (71.4%)**	5 (23.8%)	1 (4.8%)	**8 (38.1%)**	8 (38.1%)	5 (23.8%)	**20 (95.2%)**	0	1 (4.8%)	0.39	<0.01*	0.001*
12. ***With a lot of support from family and health-care professionals, people with diabetes can cope with the demands of diabetes***	**21 (100%)**	0	0	**19 (90.5%)**	1 (4.8%)	1 (4.8%)	**20 (95.2%)**	1 (4.8%)	0	**21 (100%)**	0	0	0.59	0.82	1.0

(Diabetics can enjoy a normal life)															

Statistical significance was at ≤ 0.05

As can be seen in Table 4.6, the majority of participants in both groups' pre- and posttest phases correctly indicated answers to the following questions: 1, 2, 3, 5, 6, 7, 8, 11 and 12. However, participants in both groups failed to answer questions 4, 9, and 10 correctly consistently, across the pre and posttest phases.

As these results of the two groups are so similar, it is not unexpected to find the p values depicting similar results. The reason for statistical significance being found for questions 6 and 11 for the experimental group needs further investigation. Only questions 9 and 11 indicated a difference across the control and experimental groups. The reason why only these two questions indicated a statistically significant difference also needs further investigation.

Most participants in both groups across the pre- and posttest phases correctly identified that people with diabetes should not wear pointed shoes. Kaya and Karaca (2018:8) recommend that nurses should be knowledgeable about foot care; unfortunately, nurses do not always put this knowledge into practice. Failure to use the knowledge leads to complications of diabetic foot (Bagweneza, Musabirema, Mwiseneza, Collins & Bhengu, 2019: 176).

According to Shetty and Swapnika (2017: 88), most nurses possess knowledge about diabetic retinopathy. However, the nurses do not practice the screening process for diabetic retinopathy, and some nurses do not know that diabetic retinopathy is not curable. Lange and Pearce (2017:203) declare that acquisition of diabetes management knowledge does not always culminate in better care of patients.

Most participants in both groups correctly identified that brisk walking daily for 30 minutes is good for lowering blood glucose levels. However, Bagweneza and colleagues (2019:175), in their study, found that most nurses believe that brisk walking has an effect on reducing body weight, and not on lowering blood glucose levels.

In both groups across the pre and posttest phases, participants failed to consistently and correctly identify that exercise increases glucose uptake by the muscles and insulin sensitivity. This is in line with what Bagweneza and colleagues (2019: 175) found in their study, namely, that nurses do not have knowledge on how physical activity affects blood glucose control. The knowledge that most nurses have about physical activity is only about its effects on reducing weight, and not blood glucose control. This lack of knowledge has

negative effects on the education the nurses provide to their diabetes patients for managing their condition.

Knowledge that weight loss in obese diabetes patients can improve blood glucose levels was good in both groups. This finding is in line with that of Bagweneza and colleagues (2019: 175), who found that most nurses have knowledge of weight loss in conjunction with blood glucose control.

Most participants in the control and experimental groups correctly identified that poor control of blood glucose can lead to loss of sensation in the periphery. Naza, Bojerenu, Safdar and Marwat (2016: 112) identified that most nurses have knowledge of glucose control in foot care, though they lack the confidence to teach their patients about this concept.

There was correct identification by most participants in both groups across the pre- and posttest phases that meals for people with diabetes should be small and frequent. However, Alotaibi, Al-Ganmi, Gholizadeh and Perry (2016: 12), in an intergrative review, realised that few nurses had adequate knowledge about nutrition of diabetes patients.

Knowledge was high in both groups across the pre- and posttest phases concerning the requirement that people with diabetes should eat unrefined carbohydrates, such as whole-wheat grains, vegetables and fruits. Dieticians and nutritionists are the specialists who normally provide nutritional guidance to patients. However, in the PHC centres, nurses take up that role due to a shortage of nutrition specialists. However, Mogre, Ansah, Marfo and Garti (2015:43) realised that the same nurses who have to give education on nutrition in diabetes have inadequate knowledge of nutritional requirements of diabetes.

There was significantly little knowledge in both the control and experimental groups across the pre- (47.6%, 14.3%) and posttest phases (57.6%, 57.1%) with regard to insulin not being the first-line drug of choice for Type 2 diabetes. Lange and Pearce (2017:20) reiterate that knowledge of medications used in diabetes management is not as good as it should be. Nurses do not display confidence in their knowledge of diabetes management, leading to the gap between actual knowledge and what nurses practice on real patients.

A small number of participants in both groups correctly identified that insulin administered in an overused site will not be absorbed faster. However, this does not correspond with the findings of a study by Adhikari, Poudel, Rajbanshi and Shrestha (2018:3), who report that the majority of nurses have knowledge of the negative effects of injecting insulin in lipohypertrophic areas.

Results of the posttest of both groups show that most participants correctly identified that depression is common in patients with diabetes. However, Pols, Schipper, Overkamp, Van Marwijk, Van Tulder and Adriaanse (2018:9) identified that few nurses have adequate knowledge of depression in diabetes, instead, they associate the signs of depression in diabetes patients with attention seeking.

In both the experimental and control groups across the pre- and posttest, participants correctly identified that people with diabetes can cope with the demands of diabetes if they receive a lot of support from family and health professionals. This finding is in line with that of Karimy, Koohestani and Araban (2018:3), who report that most nurses know about the need for social support from family and health professionals to adhere to diabetes self-care behaviour.

4.4 OBJECTIVE 3: FACILITATE INTERACTIVE WORKSHOPS AND ASSESS THE FEASIBILITY OF INTERACTIVE DIABETES WORKSHOPS FOR PRIMARY HEALTH CARE NURSES POST THE INTERACTIVE WORKSHOPS BY MEANS OF A LIKERT SCALE – STAGE 3

Results of the assessment of the feasibility of interactive diabetes workshops for PHC nurses post the interactive workshops by means of a Likert scale (Addendum H) will be discussed in this section. Table 4.7 depicts responses of participants in the experimental group to statements in the Likert scale.

Table 4.7: Responses of participants from the experimental group to statements in the Likert scale

Statement	Responses from experimental group (n=21) Frequency (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. Workshop objectives were stated clearly and met	18 (85.7%)	3 (14.3%)			
2 The interactive activities were engaging	17 (80.9%)	4 (19%)			
3. The workshop was well organised	15 (71.4%)	5 (23.8%)	1 (4.8%)		
4. The information and/or skills presented were relevant	18 (85.7%)	3 (14.3%)			
5. The presenter provided adequate time for questions and answered them satisfactorily	16 (76.2%)	5 (23.8%)			
6. The workshop increased my knowledge and skills of diabetes	20 (95.2%)	1 (4.8%)			
7. Instructions given during the workshop were clear	20 (95.2%)	1 (4.8%)			
8. The pace of the workshop was appropriate	17 (80.9%)	3 (14.3%)	1 (4.8%)		
9. The physical arrangements were adequate	15 (71.4%)	6 (28.6%)			

All the participants agreed that the objectives of the workshop were clearly stated and that the interactive activities during the workshop were engaging for them. Most of the participants (95.2%) agreed that the workshop was well organised, except for one (4.8%) participant, whose response was neutral on this aspect.

A high rate of satisfaction related to organisational aspects of interactive workshops have also been reported elsewhere (Choi & Won, 2013: 54; Elliot *et al*. 2016: 74).

There was unanimous agreement that the information presented in the workshop was relevant, and participants perceived their diabetes-related knowledge and skills to have increased. The instructions given during the workshop were clear to all participants. All the participants agreed that the facilitator allowed enough time for questions to be asked and managed to respond to all the questions satisfactorily. Most of the participants (95.2%) were satisfied with the pace of the workshop. However, one participant (4.8%) was neutral about the issue. All the participants agreed that the physical arrangements of the workshop were adequate.

4.4.1 Comments and suggestions about the workshop

After completion of the workshop, participants were asked to comment on the workshop and give suggestions for future facilitation of such workshops. Feedback in this regard was received from 17 (80.9%) participants – this is a higher percentage than the 72% of participants who responded in a study by Elliot and colleagues (2016: 74).

Thematic analysis of comments and suggestions provided by participants was done and three themes emerged. The first theme was scheduled time of workshops; the second theme was about inclusion of other health workers in the workshops; and the third theme was about the positive experience provided by the workshops.

- *Theme 1: scheduled time of workshops*

Suggestions were that workshops are scheduled for afternoons after work at the PHC clinics. This is in line with Jaberansari and Khali (2016: 327), who report that participants in their conference enjoyed the workshops that were held in the afternoon more than any other time of day.

- *Theme 2: Inclusion of other health workers in workshops*

Suggestions were made that workshops be rolled out to different cadres in the health professions, such as village health care workers who work with patients living with diabetes. Including other health workers from different professions in the interactive workshops could culminate in enhanced interprofessional teamwork and improved patient management (Carney, Thayer, Palmer, Galper, Zierler & Eiff, 2019: 119).

- *Theme 3: Positive experience of workshops*

Participants commented that the workshops were very exciting and informative. They expressed satisfaction with participating in the workshops. This confirms the findings of a study elsewhere, where participants were satisfied with their participation in a workshop, which led to their perceived confidence and enhanced skills (Zaider *et al.* 2016: 209).

4.5 CONCLUSION

In this chapter, results that lead to the achievement of the four objectives of the study were discussed. The four objectives were to develop an interactive workshop programme according to previously identified key diabetes-related messages; determine diabetes-related knowledge by means of a pretest and posttest diabetes questionnaire; facilitate interactive workshops; and assess the feasibility of interactive diabetes workshops for PHC nurses post the interactive workshops by means of a Likert scale. Chapter 5 will conclude the dissertation by providing recommendations and explaining the limitations of the study.

CHAPTER 5:
RECOMMENDATIONS, LIMITATIONS AND VALUE OF THE STUDY

5.1 INTRODUCTION

This study was aimed at answering the following question: Are interactive diabetes workshops feasible for PHC nurses in a Free State sub-district as a method of teaching? The study formed part of a complex intervention research study that followed a phased approach that allowed researchers to work towards assessing the feasibility of a health dialogue model designed in a previous research cycle. This study focused on Phase 3 of the complex intervention, namely, evaluating the feasibility of interactive workshops as training platforms for nurses caring for patients diagnosed with diabetes in a Free State sub-district. The objectives of the study, which relate to describing the feasibility of interactive diabetes workshops for PHC nurses in a Free State sub-district, were to develop an interactive workshop programme according to previously identified key diabetes-related messages; determine diabetes-related knowledge for PHC nurses by means of a pretest and posttest diabetes questionnaire; facilitate interactive diabetes workshops; and assess the feasibility of interactive diabetes workshops for PHC nurses post interactive diabetes workshops. In the previous chapters, a review of literature and the methodical approaches used in the study were given, and the presentation and analysis of the results were discussed. The purpose of this chapter is to outline recommendations emanating from the findings of this study. Furthermore, a discussion on limitations, the value of the study and reflection by the researcher will be presented.

5.2 RECOMMENDATIONS RELATED TO THE FEASIBILITY OF INTERACTIVE DIABETES WORKSHOPS FOR PRIMARY HEALTH CARE NURSES

In this section, the recommendations from the findings, as aligned to the objectives of the study and, where applicable, to the relevant principle that underpinned the interactive diabetes workshops, will be presented. The four principles are constructivism, constructive alignment, scaffolding and authenticity.

5.2.1 Recommendations related to Objective 1: Develop an interactive workshop programme according to previously identified key diabetes-related messages using a literature search

The contents of the interactive diabetes workshops focused on six diabetes-related key messages identified from previous research. Therefore, if the Department of Health should consider using interactive diabetes workshops as a training platform, the programme activities that the training unit needs to develop should include small-group discussions, role playing, case scenarios and Kagan's rally coach and timed pair share. The content of the six diabetes-related messages refers to methods of preventing complications in diabetes, meals of diabetic patients, exercise in diabetes, diabetic medications, weight loss and positive lifestyle in diabetes. The training programmes could be scheduled once every year, considering that some of the PHC nurses had their last refresher training courses in 2012, as evidenced by the responses of the participants to the questionnaire.

There is also a need for follow-up research on the nurses who participated in the interactive diabetes workshops of this study, to establish the degree of retention and use of acquired diabetes-related knowledge.

Special consideration should be made by the training unit of the Department of Health to include some of the PHC nurses as facilitators of the interactive workshops. These nurses could be fundamental in upholding the principle of constructivism, since they already have the skills as a result of their participation in the interactive diabetes workshops.

5.2.2 Recommendations related to Objectives 2 and 4: Determine diabetes-related knowledge by means of a pretest and posttest diabetes questionnaire

The contents of the pre/posttest should cover information emanating from the six key diabetes-related messages. However, the results of this study reveal that greater emphasis should be on information pertaining to insulin administration and its absorption in the body, nutrition advice and exercise in diabetes. There is a need to search for literature on these areas in order to develop pre/posttests that would cover the intended content in order to align with the principle of constructive alignment. Therefore, there is a need to establish

collaboration between the Free State Department of Health training unit and the UFS research departments, to present ongoing refresher training programmes for PHC nurses.

5.2.3 Recommendations related to Objective 3: Facilitate interactive workshops and assess the feasibility of interactive diabetes workshops for primary health care nurses post-interactive workshops by means of a Likert scale

Recommendations are made for the training unit of the Free State Department of Health. Should this unit consider using interactive workshops as a training platform, there is a need to schedule interactive diabetes workshops at the PHC clinics for the afternoons, when the patient load is less intense. Friday afternoons could be considered feasible for facilitating interactive diabetes workshops. However, the exact days for the facilitation of workshops can be on a schedule basis with the PHC clinic nurses, so that they can notify their communities in advance of the scheduled training. There is a need to include other health workers in the interactive workshops, to enhance interprofessional teamwork, which could culminate in improved patient care at PHC clinics.

In order to enhance the feasibility of the interactive workshops, there is a need to set clearly outlined objectives for the participants. The pace of facilitation should be pitched at a level that ensures that the participants remain engaged and learn from the interactive activities. In line with the principles of constructivism and scaffolding, the examples of interactive activities that could be used during facilitation of workshops are group discussions, role playing, case scenarios and Kagan's rally coach and timed pair share. These activities must be coupled with clear instructions and adequate physical arrangements for the workshops to be successful.

5.3 LIMITATIONS OF THE STUDY

The busy work schedules of the participants led to participant attrition. One nurse had to leave during the workshop time to attend to patients. In an endeavour to curb participant attrition, the researcher made appointments with participants at the different sites prior to the interactive diabetes workshops, to enable them to indicate dates and times that were suitable for the workshops. However, it is worth noting that PHC clinics provide health service until the last patient is served.

The data collection tool did not allow participants to provide qualitative information on their knowledge of diabetes management. However, the knowledge statements in the pre/posttest were adapted from the Health-Related Quality of Life, EQ-5D-3L instrument by the Euroqol Group (cited by Cardoso, *et al.* 2016: 34) and a Type 2 diabetes mellitus knowledge, attitude and practice questionnaire used in the Free State, South Africa (Le Roux *et al*. 2019: 86; Reid *et al.* 2018: 128).

The small sample size that was used in the study does not allow for generalisation of results to a wider nurse population. Nonetheless, the rigorous nature of the research process allows other researchers to repeat the research process. The reader may decide whether the results of the study can be transferred or applied to another context.

The pre- and posttests were taken a few hours apart, which could have affected reliability of the results.

5.4 VALUE OF THE STUDY

The most important shareholders who could benefit from the results of this study are patients diagnosed with diabetes. Patients could possibly receive good nursing care and health education on how to control and prevent diabetes, leading to healthy lifestyles. This could be feasible if nurses are empowered with diabetes-related knowledge.

The interactive diabetes workshops could lead to possible enhancement of diabetes-related knowledge for nurses. Enhancing knowledge could improve the confidence of nurses in relation to delivering health services. Their confidence, coupled with knowledge empowerment, could translate into improved health service delivery.

The mission statement of the Department of Health is “to improve the health status of patients through prevention of illness and the promotion of healthy lifestyles” (DoH, 2019: 18). The Department of Health could use interactive workshops as a training platform to equip PHC nurses with diabetes-related knowledge. This acquired knowledge could be transferred to rendering quality nursing care, hence, improve the health status of patients through preventing illness and promoting healthy lifestyles.

5.5 REFLECTION BY THE RESEARCHER

This study has proved to be of great value to my personal development. Before this study, my belief was that the more years of experience that heath care professionals have in the clinical area, the more enhanced their knowledge of management of patients will be. However, my experience in this study and review of literature has revealed that this is not always true. There is a need for continuous professional development of nurses, to refresh and enhance their knowledge of management of various conditions.

My information technology skills have been sharpened. I have learnt to review literature, and the importance of being thorough in my work. The search for literature has revealed to me that there is a great deal of literature that has been generated that awaits discovery. However, there are also gaps in literature that need researchers to engage in research in order to fill the gaps.

My communication skills have been enhanced, since I had to learn to negotiate and set appointments for the implementation of the interactive diabetes workshops with nurses whom I had never met before, and who spoke native languages foreign to me.

There have been difficult experiences in the journey of this study, but those have made me a better person than when I started.

5.6 CONCLUSION

In this chapter, a discussion of the recommendations according to the four objectives of the study was provided. This was followed by an outline of the limitations of the study. A discussion of the value of the study and reflection of the researcher were given. In conclusion, results of the study reveal that presenting interactive diabetes workshops is a feasible method of training for PHC nurses in a Free State sub-district.

> *Learning is more effective when it is an active rather than a passive process. - Kurt Lewin*

REFERENCES

Adhikari, S., Poudel, R., Rajbanshi, L. & Shrestha, S. 2018. Assessment of insulin injection practice of nurses working in a tertiary healthcare center of Nepal. *Nursing Research and Practice,* 2018(1), pp. 1-6.

Adom, D., Hussein, E.K. & Agyem, J.A. 2018. Theoretical and conceptual framework: Mandatory ingredients of a quality research. *International Journal of Scientific Research,* 7(1), pp. 438-441.

AlReshidi, N.M. 2016. *The impact of an interactive educational programme on children's nurses' knowledge, attitudes, beliefs and perceptions of children's pain, self- efficacy, and perceptions of barriers to optimal post-operative pain management in children.* PhD Thesis. Manchester: University of Salford.

Ali, L. 2018. The design of curriculum, assessment and evaluation in higher education with constructive alignment. *Journal of Education and e-Learning Research,* 5(1), pp. 72-78.

Alotaibi, A., Al-Ganmi, A., Gholizadeh, A. & Perry, L. 2016. Diabetes knowledge of nurses in different countries: An integrative review. *Nurse Education Today,* 16(1), pp. 1-47.

American Diabetes Association. 2016. Obesity management for the treatment of type 2 diabetes. *Diabetes Care,* 39(1), pp. S47-S51.

American Diabetes Association. 2017. Classification and diagnosis of diabetes. *Diabetes Care,* 40(1), pp. S11-S24.

American Diabetes Association. 2018. Classification and diagnosis of diabetes: Standards of medical care in diabetes – 2018. *Diabetes Care,* 41(1), pp. S13-S27.

American Diabetes Association. 2019. Standards of medical care in diabetes – 2019. Abridged for primary care providers. *Clinical Diabetes,* 37(1), pp. 11-34.

Amineg, R.J. & Asl, H.D. 2015. Review of constructivism and social constructivism. *Journal of Social Sciences, Literature and Languages,* 1(1), pp. 9-16.

Asiry, M.A. 2016. Learning styles of dental students. *The Saudi Journal for Dental Research,* 7(1), pp. 13-17.

Aslam, N., Khanam, A., Fatima, G., Akbar, A. & Muhammad, N. 2017. A study of the impact of scaffolding instructions on the learning achievements of post-graduate students. *Journal of Arts and Social Science,* 4(1), pp. 1-10.

Assodeh, M.H., Assodeh, M. & Zarepour, M. 2012. The impact of student-centered learning on academic achievement and social skills. *Procedia-Social and Behavioural Sciences,* 46(1), pp. 560-564.

Atanga, M.B.S., Abgor, N. & Ayangwo, J. 2015. Criticisms of the “lecture” method in the teaching of nursing students: The case of nurse tutors in Bamenda, Cameroon. *British Journal of Medicine & Medical Research,* 6(4), pp. 1-7.

Austin-Evelyn, K., Rabkin, M.; Macheka, T., Mutiti, A., Mwansa-Kambafwile, J., Dlamini, T. & El-Sadr,W.M. 2017. Community health worker perspectives on a new primary health care initiative in the Eastern Cape of South Africa. *PLoS ONE,* 12(3), pp. 1-13.

Awases, M., Bezuidenhout, M. & Roos, J.H. (2013). Factors affecting the perfomance of professional nurses in Namibia. *Curationis,* 36(1), pp. 1-8.

Babbie, E. 2010. *The practice of social research.* 12th ed. Belmont: Wadsworth Cengage.

Bada, S.O. 2015. Constructivism learning theory: A paradigm for teaching and learning. *Journal of Research and Method in Education,* 5(6), pp. 66-70.

Badescu, S.V., Tataru, C., Kobylinska, L., Georgescu, E.L., Zahiu, D.M., Zagrean, A.M. & Zagrean, L. 2016. The association between diabetes mellitus and depression. *Journal of Medicine and Life,* 9(2), pp. 120-125.

Bagweneza, V., Musabirema, P., Mwiseneza, M.J., Collins, A. & Bhengu, B.R. 2019. Diabetes health education: Nurses' knowledge of essential components at a Rwandan hospital. *Rwanda Journal of Medicine and Health Sciences,* 2(2), pp. 172-177.

Balaji, P.A. & Varne, S.R. 2017. Physiological effects of brisk walking, yoga and non-walking on metabolic parameters and anthropometry among type 2 diabetic patients. *International Journal of Physiology, Nutrition and Physical Education,* 2(1), pp. 99-102.

Ballou, J., Wiseman, C., Jackson, L., Godfrey, R. & Cagle, D. 2017. Lactation skills workshop: A collaboration of the City of Dallas WIC and local hospitals. *Journal of Nutrition Education and Behavior,* 49(1), pp. S202-S206.

Barbour, C. & Schuessler, J.B. 2019. A preliminary framework to guide implementation of the flipped classroom method in nursing education. *Nurse Education in Practice,* 34(1), pp. 36-42.

Bennich, B.B., Roder, M.E., Overgaard, D., Egerod, I., Munch, L., Knop, F.K., Vilsboll, T. & Konradsen, H. 2017. Supportive and non-supportive interactions in families with a type 2 diabetes patient: an intergrative review. *Diabetology and Metabolic Syndrome,* 9(57), pp. 1-9.

Biggs, J.B. 2001. The reflective institution: Assuring and enhancing the quality of teaching and learning. *Higher Education,* 14(1), pp. 221-238.

Biggs, J.B. 2003. *Teaching for quality learning at university.* 2nd ed. Buckingham: Open University Press/Society for Research into Higher Education.

Biniecki, S.M.Y. & Kang, H. 2014. Examining adult learning through the lens of culture: A US perspective. *Rocznik Andragogiczny,* 21(1), pp. 133-142.

Bird, S.R. & Hawley, J.A. 2017. Update on the effects of physical activity on insulin sensitivity in humans. *British Medical Journal Open Sport & Exercise Medicine,* 2(1), pp. 1-26.

Bland, A.J., Topping, A. & Tobbell, J. 2014. Time to unravel the conceptual confusion of authenticity and fidelity and their contribution to learning within simulation-based nurse education. A discussion paper. *Nurse Education Today,* 341(1), pp. 1112-1118.

Botma, Y., Greeff, M., Mulaudzi, F.M. & Wright, S.C.D. 2010. *Research in health sciences.* 1st ed. Cape Town: Pearson Education.

Botma, Y. & Nyoni, C. 2015. What went wrong? A critical reflection on educator midwives' inability to transfer education knowledge. *Journal of Nursing Education and Prcatice,* 5(6), pp. 1-8.

Boulton, A.J.M., Amstrong, D.G., Kirsner, R.S., Attinger, C.E., Lavery, L.A., Lipsky, B.A., Mills, J.L. & Steinberg, J.S. 2018. Diagnosis and management of diabetic foot complications. *Diabetes,* 2(1), pp. 1-20.

Bradbury, N. 2016. Attention span during lectures: 8 seconds, 10 minutes, or more?. *Advances in Physiology Education,* 40(1), pp. 509-513.

Brink, H., van der Walt, C. & van Rensburg, G.H. 2017. *Fundamentals of research methodology for healthcare professionals.* 4th ed. Cape Town: Juta & Company.

Brown, C.R., Johnson, A.S. & Appling, S.E. 2011. A taste of nursing research: an interactive program introducing evidence-based practice and research to clinical nurses. *Journal for Nurses in Staff Development ,* 27(6), pp. E1-E5.

Bruner, J.S. 1975. The ontogenesis of speech acts. *Journal of Child Language,* 2(1), pp. 1-40.

Cain, A., Grundy, J. & Woodward, C.J., 2018. Focusing on learning through constructive alignment with task-oriented portfolio assessment. *European Journal of Engineering Education,* 43(4), pp. 569-584.

Cambridge Dictionary. 2019. *Cambridge business English dictionary.* Cambridge: Cambridge University Press.

Cardoso, A.F., Cruz, R., Queiros, P., Santiago, L., Ribeiro, C.F., Ferreira, P.L. 2016. Assessment of health-related quality of life using the EQ-5D-3L in individuals with type 2 diabetes mellitus. *Journal of Diabetes, Metabolic Disorders & Control,* 3(2), pp. 33-40

Carney, P.A., Thayer, E.K., Palmer, R., Galper, A.B., Zierler, B. & Eiff, M.P. 2019. The benefits of interprofessional learning and teamwork in primary care ambulatory training settings. *Journal of Interprofessional Education and Practice,* 15(1), pp. 119-126.

Chen, W. 2017. Effectiveness of integrating role play with didactic lecture, video review, and group discussion in enhancing interview skills of new psychiatric nurses. *Academic Psychiatry,* 41(1), pp. 146-148.

Chester, B., Stanley, W.G. & Geetha, T. 2018. Quick guide to type 2 diabetes self-management education: creating an interdisciplinary diabetes management team. *Diabetes, Metabolic Syndrome and Obesity,* 11(1), pp. 641-645.

Chiang, H.C., Lin, F.Y. & Hwu, Y.J. 2013. Disability assessment: The efficacy of multimedia interactive nurse education. *The Journal of Nursing Research,* 21(2), pp. 83-93.

Choi, Y.J. & Won, M.R. 2013. A pilot study on effects of a group program using recreational therapy to improve interpersonal relationships for undergraduate nursing students. *Archives of Psychiatry Nursing,* 27(1), pp. 54-55.

Cimermanova, I. 2018. The effect of learning styles on academic achievement in different forms of teaching. *International Journal of Instruction,* 11(3), pp. 219-232.

Clerihew, L., Rowney, D. & Ker, J. 2016. Simulation in paediatric training. *Archives of Disease in Childhood – Education and Practice Edition,* 101(1), pp. 8-14.

Clowes, G. 2011. *The essential 5: A starting point for Kagan cooperative learning.* San Clemente, CA: Kagan Publishing.

Colberg, S.R., Sigal, R.J., Yardley, J.E., Ridell, M.C., Dunstan, D.W., Dempey, P.C., Horton, E.S., Castorino, K. & Tate, D.F. 2016. Physical activity/exercise and diabetes: A position statement of the American Diabetes Association. *Diabetes Care,* 39(11), pp. 2065-2079.

Cometto, G., Scheffler, R., Bruckner, T., Liu, J., Maeda, A., Tomblin-Murphy, G., Hunter, D. & Campbell, J. 2016. *High-level commission level on health, employment and economic growth.* Geneva: World Health Organization.

Coombs, N.M. 2018. Educational scaffolding: Back to basics for nursing education in the 21st century. *Nurse Education Today,* 68(1), pp. 198-200.

Creswell, J.W. 2014. *Research design: Qualitative, quantitative and mixed methods.* 4th ed. Los Angeles: Sage Publications.

Cuevas, J. & Dawson, B.L. 2018. A test of two alternative cognitive processing models: Learning styles and dual coding. *Theory and Research in Education,* 16(1), pp. 40-64.

Dagar, V. & Yadav, A. 2016. Constructivism: A paradigm for teaching and learning. *Arts and Social Sciences Journal,* 7(4), pp. 1-4.

De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. 2011. *Research at grassroots. For the social sciences and human service professions.* Pretoria: Van Schaik Publishers.

Deeb, G.R., Johnson, A., Bondarew, M., Carrico, C., Laskin, D. & Deeb, J.G. 2016. How effective is a dental workshop at improving the knowledge and confidence of medical students in the management of dental emergencies?. *Journal of Medical Education and Curricular Development,* 3(1), pp. 91-96.

Dennick, R. 2016. Constructivism: reflections on twenty five years teaching the constructivist approach in medical education. *International Journal of Medical Education,* 7(1), pp. 200-205.

Dewell, R., Hanthorn, C., Danielson, J., Burzett, R., Coetzee, J., Griffin, D. D., Ramirez, A. & Dewell, G. 2015. Evaluation of an interactive workshop designed to teach practical welfare techniques to beef cattle caretakers and decision makers. *Journal of Extension,* 53(4), pp. 1-6.

Diabetes Australia. 2015. *Food and activity.* [Online]
Available at: https://www.diabetes australia.com.au/mainting-a healthy-weight
[Accessed 27 July 2019].

Diabetes Australia. 2018. *Low carbohydrate eating for people with diabetes.* [Online]
Available at: https://static.diabetesaustralia.com.au/s/fileassets/diabetes-australia/8b4a8a54-f6b0-4ce6-bfc2-159686db7983.pdf
[Accessed 27 July 2019].

Diabetes Canada Clinical Practice Guidelines Expert Committee. 2018. 2018 Clinical practice guidelines nutrition therapy. *Canadian Journal of Diabetes,* 42(1), pp. S1-S326.

Diabetes UK. 2019. *Treatment.* [Online]
Available at: https://www.diabetes.co.uk/insulin/injection-sites.html
[Accessed 27 July 2019].

Dizon, J.M., Grimmer, K., Machingaidze, S., McLaren, P. & Louw, Q. 2016. Mapping South African allied health primary care clinical guideline activity: establishing a stakeholder reference sample. *Health Research Policy and Systems,* 14(77), pp. 1-8.

DOH (Department of Health South Africa). 2017. *National health insurance for South Africa: Towards universal health coverage.* Pretoria: Government Printer.

DOH (Department of Health South Africa). 2018. *Department of Health Annual Report 2017/2018.* Pretoria: Government Printer.

DOH (Department of Health South Africa). 2013. *Strategic plan for nursing education, training and practice,* Pretoria: Government Printer.

DOH (Department of Health South Africa). 2019. *National Department of Health annual report 2018/2019*. Pretoria: Government Printer.

Doherty, J., Coughlan, B., Casey, B., Lloyd, B., Sheehy, L., Brosnan, M., Barry, T., McMahan, A. & Cullen, S. 2018. Student midwives' education needs and their experience

of attending a bereavement education workshop. *British Journal of Midwifery,* 26(8), pp. 523-531.

Dookie, S. & Singh, S. 2012. Primary health services at district level in South Africa: a critique of the primary health care approach. *BMC Family Practice,* 13(1), p. 67.

Dorit, A. & Yariv, I. 2019. The connection between perceived constructivist learning environments and faculty uncivil authoritarian behaviors. *The International Journal of Higher Education Research,* 77(3), pp. 437-454.

Duet Diabetes. 2018. *Workshops.* [Online]
Available at: https://www.duetdiabetes.co.uk/workshops
[Accessed 16 November 2019].

Ekpenyong, L.E. & Edokpolor, J.E. 2016. Constructivist approaches: an emerging paradigm for the teaching and learning of business education. *Nigerian Journal of Business Education,* 3(1), pp. 149-158.

Elliott, C., Creighton, S.M., Barker, M.J. & Liao, L.M. 2016. A brief interactive training for healthcare professionals working with people affected by "female genital mutilation": Initial pilot evaluation with psychosexual therapists. *Sexual and Relationship Therapy,* 31(1), pp. 70-82.

Erickson, J.M., Blackhall, L., Brashers, V. & Varhegyi, N. 2015. An interprofessional workshop for students to improve communication and collaboration skills in end-of-life care. *American Journal of Hospice and Palliative Medicine,* 32(8), pp. 876-880.

Erny-Albrecht, K., Bywood, P. & Oliver-Baxter, J. 2015. *The role of primary care in primary and secondary prevention of diabetes and related complications. PHCRIS Policy Issue Review.* Adelaide: Primary Health Care Research & Information Service.

Eslamian, J., Moeini, M. & Soleimani, M. 2015. Challenges in nursing continuing education: A qualitative study. *Iranian Journal of Nursing and Midwifery Research,* 20(3), pp. 378-386.

Eun, B. 2019. The zone of proximal development as an overarching concept: A framework for synthesizing Vygotsky's theories. *Educational Philosophy and Theory,* 51(1), pp. 18-30.

Fairall, L.R., Folb, N., Timmerman, V., Lombard, C., Steyn, K., Bachmann, M.O. & Bateman, E.D. 2016. Educational outreach with an integrated clinical tool for nurse-led non-

communicable chronic disease management in primary care in South Africa: A pragmatic cluster randomised controlled trial. *PLosMed,* 13(11), pp. 1-27.

Fawcett, J. 2017. Thoughts about nursing conceptual models and the “medical model”. *Nursing Science Quarterly,* 30(1), pp. 77-80.

Fernando, S.Y.J.N. & Marikar, F.M.M.T. 2017. Constructivist teaching/learning theory and participatory teaching methods. *Journal of Curriculum and Teaching,* 6(1), pp. 110-122.

Forouhi, N.G., Misra, A., Mohan, V., Taylor, R. & Yancy, W. 2018. Dietary and nutritional approaches for prevention and management of type 2 diabetes. *The British Medical Journal,* 361(1), pp. 1-9.

Gallagher, G. 2017. Aligning for learning: Including feedback in the constructive alignment model. *The All Ireland Society for Higher Education,* 9(1), pp. 1-13.

Gavin, C. 2011. *A starting point for Kagan cooperative learning.* San Clemente, CA: Kagan Publishing.

Gentile, S., Strollo, F. & Ceriello, A. 2016. Lipodystrophy in insulin-treated subjects and other injection-site skin reactions: Are we sure everything is clear?. *Diabetes Therapy,* 7(1), pp. 401-409.

Gewurtz, R., Coman, L., Dhillon, S., Jung, B. & Solomon, P. 2016. Problem-based learning theories of teaching and learning in health professional education. *Journal of Perspectives in Applied Academic Practice,* 4(1), pp. 59-70.

Ghadyani, L., Tavafian, S.S., Kazemnejad, A. & Wagner, J. 2017. Effectiveness of multidisciplinary group-based intervention versus individual physiotherapy for improving chronic low back pain in nursing staff: A clinical trial with 3- and 6-month follow-up visits from Tehran, Iran. *Asian Spine Journal,* 11(3), pp. 396-404.

Gorina, M., Limonero, J.T. & Alvarez, M. 2018. Effectiveness of primary healthcare educational interventions undertaken by nurses to improve chronic disease management in patients with diabetes mellitus, hypertension and hypercholesterolemia: A systematic review. *International Journal of Nursing Studies,* 86(1), pp. 139-150.

Gouldthorpe, J. & Israel, G. 2016. *Capturing change: Comparing pretest-posttest and retrospective evaluation methods.* Florida: University of Florida/IFAS.

Grand Canyon University. 2019. Doctoral research. (online). Available at: https://www.gcu.edu. [Accessed December 2019].

Gray, A. & Vawda, Y. 2017. *South African health review 2017,* Durban: Health Systems Trust.

Gray, D.E. 2014. *Doing research in the real world.* 3rd ed. Carlifornia: Sage Publications.

Gray, J., Grove, S.K. & Sutherland S. 2016. *The practice of nursing research: Appraisal, synthesis and generation of evidence.* 8th ed. St Louis: Saunders Elsevier.

Grove, S. & Gray, J. 2018. *Understanding nursing research. Building an evidence-based practice.* 7th ed. Missouri: Elsevier Saunders.

Habibzadeh, F., Aliha, J.M., Imanipour, M. & Mehran, A. 2017. The effect of interactive workshop on the quality of intra-hospital patients' transfer: A quasi-experimental study. *Nursing Practice Today,* 4(2), pp. 79-86.

Hallingberg, B., Turley, R., Segrott, J., Wight, D., Craig, P., Moore, L., Murphy,S., Robling, M., Simpson, S.A. & Moore, G. 2018. Exploratory studies to decide whether and how to proceed with full-scale evaluations of public health interventions: a systematic review of guidance. *Pilot Feasibility Studies*, 4(104), pp. 1-12

Halpin, S.N. 2015. Evaluating the efficacy of a short aging simulation workshop for an interdisciplinary group of health care employees at a Veterans Affairs medical center. *Journal of Educational Gerontology,* 41(1), pp. 207-215.

Heale, R. & Twycross, A. 2015. Validity and reliability in quantitative studies. *Evidence-Based Nursing,* 18(3), pp. 66-67.

Hermandez-Alonso, P., Camacho-Barcia, L., Bullo, M. & Salas-Salvado, J. 2017. Nuts and dried fruits: An update of their beneficial effects on type 2 diabetes. *Nutrients,* 9(673), pp. 1-34.

Higgins, J.P.T. & Green, S. 2011. *Cochrane handbook for systematic reviews of interventions Version 5.1.0.* [Online]
Available at: http://handbook.cochrane.org.
[Accessed April 2018].

Higuchi, K.S., Edwards, N., Carr, T., Marck, P. & Abdullah, G. 2015. Development and evaluation of a workshop to support evidence-baseed practice change in long-term care. *Journal for Nurses in Professional Development,* 31(1), pp. 28-34.

Hlongwana, S., Bezuidenhout, S. & Helberg, E. 2015. Adherence to the primary health care standard treatment guidelines in a pediatric sample with respiratory conditions in Umkhanyakude Health District, KwaZulu-Natal, South Africa. *African Journal for Physical, Health Education, Recreation and Dance,* 2(1), p. 520.

Hussmann, P.R. & O'Loughlin, V.D. 2019. Another nail in the coffin for learning styles? Disparities among undergraduate anatomy students' study strategies, class performance, and reported VARK learning styles. *Anatomical Sciences Education,* 12(1), pp. 6-19.

Igumbor, J., Davids, A., Nieuwoudt, C., Lee, J. & Roomaney, R. 2016. Assessment of activities performed by clinical nurse practitioners and implications for staffing and patient care at primary health care level in South Africa. *Curationis,* 39(1), pp. 1-8.

International Council of Nurses. 2013. *Publications: Scope of nursing practice.* [Online]
Available at: http://www.icn.ch/images/stories/documents/publications/position_statements/B07_Scope_Nsg_Practice.pdf
[Accessed 7 March 2017].

International Council of Ophthalmology. 2017. *Updated 2017 ICO guidelines of diabetic eye care.* California: ICO Headquarters.

IDF (International Diabetes Federation). 2017. *Global estimates of diabetes prevalence for 2017 and projections for 2045.* Brussels: International Diabetes Federation.

IDF (International Diabetes Federation). 2019. *Our Activities: Care-prevention, eye health.* [Online]
Available at: https://www.idf.org/our-activities/care-prevention/eye-health.html
[Accessed 27 July 2019].

Jaberansari, M. & Khali, I. 2016. Conference report: British Undergraduate Dental Research Conference 2016. *British Dental Journal,* 220(7), p. 327.

Javed, S., Petropoulos, I., Alam, U. & Malik, R. 2015. Treatment of painful diabetic neuropathy. *Therapeutic Advances in Chronic Disease,* 6(1), pp. 15-28.

Jimenez, Y.A., Thwaites, D.I., Juneja, P. & Lewis, S.J. 2018. Interprofessional education: Evaluation of a radiation therapy and medical physics student simulation workshop. *Journal of Medical Radiation Sciences,* 65(2), pp. 106-113.

Jooste, K. & Hamani, M. 2016. The motivational needs of primary health care nurses to acquire power as leaders in a mine clinic setting. *Health SA Gesondheid,* 22(2016), pp. 43-51.

Kagan, S. 2007. *Kagan cooperative learning.* 1st ed. San Clemente: Kagan Publishing.

Kaira, S., Jena, B. N. & Yeravdekar, R. 2018. Emotional and psychological needs of people with diabetes. *Indian Journal of Endocrinology and Metabolism,* 22(5), pp. 696-704.

Karimy, M., Koohestani, H. & Araban, M. 2018. The association between attitude, self-efficacy, social support and adherence to diabetes self-care behaviour. *Diabetology and Metabolic Syndrome,* 10(86), pp. 1-6.

Kaya, Z. & Karaca, A. 2018. Evaluation of nurses' knowledge levels of diabetic foot care management. *Nursing Research and Practice,* 2018(1), pp. 1-12.

Knowles, S.E., Chew-Graham, C., Adeyemi, I., Coupe, N. & Coventry, P.A. 2015. Managing depression in people with multimorbidity: a qualitative evaluation of an integrated collaborative care model. *BioMed Central Family Practice,* 16(1), pp. 1-10.

Kothari, C. 2007. *Research methodology: Methods and techniques.* 2nd ed. New Dehli: New Age International Publishers.

Lancaster, G. 2015. Pilot and feasibility studies come of age! *Pilot and Feasibility Studies,* 1(1), pp. 1-4. doi: 10.1186/2055-5784-1-1

Lange, C. & Pearce, R. 2017. Exploration of diabetes knowledge among registered nurses working in an NHS Trust. *Journal of Diabetes Nursing,* 21(6), pp. 203-207.

Le Roux, M., Walsh, C., Reid, M. & Raubenheimer, J. 2019. Diabetes-related knowledge, attitude and practices (KAP) of adult patients with Type 2 diabetes mellitus in the the Free State province, South Africa. *South African Journal of Clinical Nutrition,* 32(4), pp. 83-90.

Lotfy, M., Adeghate, J., Kalasz, H., Singh, J. & Adeghate, E. 2017. Chronic complications of diabetes mellitus: A mini review. *Current Diabetes Reviews,* 13(1), pp. 3-10.

Maatouk, I., Műller, A., Angerer, P., Schmook, R., Nikendei, C., Herbst, K., Gantner, M., Herzog, W. & Gűndel, H. 2018. Healthy ageing at work – Efficacy of group interventions on the mental health of nurses aged 45 and older: Results of a randomised, controlled trial. *PLoS ONE,* 13(1), pp. 1-20.

Madan, I., Henderson, M., Hashtroudi, A., Hope, V. & Harvey, S.B. 2013. Prospective evaluation of mental health training for occupational health practitioners. *Occupational Medicine,* 63(1), pp. 217-223.

Maillacheruvu, P. & McDuff, E. 2014. South Africa's return to primary care: The struggles and strides of the primary health care system. *The Journal of Global Health,* 4(1).

Maimela, E., Alberts, M., Modjadji, S.E.P., Choma, S.S.R., Dikotope, S.A., Ntuli, T.S. & Van Geertruyden, J. 2016. The prevalence and determinants of chronic non-communicable disease risk factors amongst adults in the Dikgale Health Demographic and Surveillance System (HDSS) site, Limpopo province of South Africa. *PLosOne,* 11(2), pp. 1-18.

Mardolkar, M. 2017. Body mass index (BMI) data analysis and classification. *International Journal of Computer Science and Mobile Computing,* 6(2), pp. 8-16.

Marin-Penalver, J.J., Martin-Timon, I., Sevillano-Collantes, C. & Canizo-Gomez, F.J. 2016. Update on the treatment of type 2 diabetes mellitus. *World Journal of Diabetes,* 7(17), pp. 354-395.

Marmah, A.A. 2014. Students' perceptions about the lecture as a method of teaching in tertiary institutions. Views of students from college of technology education, Kumasi (COLTEK). *International Journal of Education and Research,* June, 2(6), p. 604.

McEwan, D., Ruissen, G.R., Eys, M.A., Zumbo, B.D. & Beauchamp, M.R. 2017. The effectiveness of teamwork training on teamwork behaviours and team performance: A systematic review and meta-analysis of controlled interventions. *PLoS ONE,* 12(1), pp. 1-23.

McLeod, S. 2018. Vygotsky. *Simply Psychology.* [Online]
Available at: https://www.simplypsychology.ord/vygotsky.html
[Accessed 16 November 2019].

Mendes, R., Sousa, N., Almeida, A., Subtil, P., Guedes-Marques, F., Reis, V.M. & Themudo-Barata, J.L. 2016. Exercise prescription for patients with type 2 diabetes – a

synthesis of international recommendations: narrative review. *British Medical Journal,* 50(1), pp. 1379-1381.

Mogre, V., Ansah, G., Marfo, D. & Garti, H. 2015. Assessing nurses' knowledge levels in the nutritional management of diabetes. *International Journal of Africa Nursing Sciences,* 2015(3), pp. 40-43.

Mohamadkhani, S.E., Alipor, A. & Hasanzadeh, P.S. 2013. Effect of cognitive therapy training in groups on health anxiety among nursing students. *Journal of Jahrom University of Medical Sciences,* 11(2), pp. 52-61.

Mohd, S., Yusof, N., Lai, L.L., Hossain, M.G., Ramalingam, S., Hamid, S.S.A.B., Ng, W.M. & Mansor, A. 2019. Improving knowledge of doctors and paramedics through effective bone procurement workshop: A cognitive approach. *BMC Medical Education,* 19(238), pp. 1-7.

Mongan-Rallis, H. 2014. *Guidelines for writing a literature review.* "How to" Guideline serie*.* [Online]. Duluth: University of Minnesota. d.umn.edu/~hrallis/guides/researching/litreview.html

Moosa, S., Derese, A. & Peersmann, W. 2017. Insights of health district managers on the implementation of primary health care outreach teams in Johannesburg, South Africa: a descriptive study with focus group discussions. *Human Resources for Health,* 15(7), pp. 1-9.

Morgan, R. 2019. Using seminars as a teaching method in undergraduate nurse education. *British Journal of Nursing,* 28(6), pp. 374-376.

Morgan, M., Deoraj, A., Felty, Q., Yoo, C. & Roy, D. 2016. Association between exposure to estrogenic endocrine disruptors – polychlorinated biphenyls, phthalates and bisphenol A and gynecologic cancers – ovarian, uterine cancers. *Journal of Carcinogenesis and Mutagenesis,* 7(4), pp. 1-14.

Morroni, C. & Myer, L. 2007. *Study design in epidemiology: A research manual for southern Africa.* Cape Town: Oxford University Press.

Murphy, K., Chuma, T., Mathews, C., Steyn, K. & Levitt, N. 2015. Qualitative study of the experiences of care and motivation for effective self-management among diabetic and hypertensive patients attending public sector primary health care services in South Africa. *BMC Public Health Services Research,* 15(1), p. 303.

Naicker, K., Johnson, J.A., Skogen, J. C., Manuel, D., Overland, S., Sivertsen, B. & Colman, I. 2017. Type 2 diabetes and comorbid symptoms of depression and anxiety: Longitudinal associations with mortality risk. *Diabetes Care,* 40(1), pp. 352-358.

NDoH (National Department of Health South Africa). 2016. *Central Chronic Medicine Dispensing and Distribution Programme: Reaching 90-90-90 in South Africa. Part III: Best practices and innovations in linkage, treatment, and viral suppression.* Pretoria: Government Printer.

NDoH (National Department of Health South Africa). 2018. *National Department of Health annual report 2017/2018.* Pretoria: Government Printer.

National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. 1978. *The Belmont Report: Ethical principles and guidelines for the protection of human subjects of research.* Washington, DC: United States Government Printing Office. Available at: https://globalhealthtrainingcentre.tghn.org/site_media/media/medialibrary/2011/04/Belmont_Report_1979.pdf

Nazar, C., Bojerenu, M., Safdar, M. & Marwat, J. 2016. Effectiveness of diabetes education and awareness of diabetes mellitus in combating diabetes in the United Kingdom: a literature review. *Journal of Nephropharmacology,* 5(2), pp. 110-115.

Neuman, W.L. 2011. *Social research methods: Qualitative and quantitative approaches.* 7th ed. Boston: Pearson Education.

Nicholson, L.L., Reed, D. & Chan, C. 2016. An interactive, multi-modal anatomy workshop improves academic performance in the health sciences: a cohort study. *BMC Medical Education,* 16(7), pp. 1-10.

Nkwake, A. 2015. *Credibility, validity, and assumptions in program evaluation methodology.* 2nd ed. London: Springer.

Nojilana, B., Bradshaw, D., Pillay-Van Wyk, V., Msemburi, W., Somdyala, N., Joubert, J.D., Groenewald, P., Laubscher, R. & Dorrington, R. 2016. Persistent burden from non-communicable diseases in South Africa needs strong action. *South African Medical Journal,* 106(5), pp. 436-437.

Nora, C.R.D., Schaefer, R. & Neves-Amado, J. 2018. Nurses' practices in the context of primary healthcare in Portugal. *Journal of Research in Nursing,* 23(6), pp. 520-532.

Nownes, A. 2019. Using a randomized, post-test only, control group survey experiment to explore the effects of celebrity candidate endorsements on voter emotions. *American Politics Research,* 45(1), p. 648–672.

Nutall, F. 2015. Body mass index. *Nutrition Today,* 50(3), pp. 117-128.

Nyoni, C. & Reid, M. 2019. Perceptions of patients regarding diabetes related health communication strategies in the Free State, South Africa. *Health SA Gesondheid,* 24(1), pp. 1-8.

O'Flaherty, J. & Phillips, C. 2015. The use of flippped classrooms in higher education: A scoping review. *The Internet and Higher Education,* 25(1), pp. 85-95.

Onsman, A. 2015. Constructively aligning the curriculum of a "new generation" Bachelor of Environments degree from a social realism perspective. *Cogent Education,* 2(1), pp. 1-12.

Papatheodorou, K., Banach, M., Bekiari, E., Rizzo, M. & Edmonds, M. 2018. Complications of diabetes 2017. *Journal of Diabetes Research,* 2018(1), pp. 1-4.

Paraizo, C.M.S., Isidaro, J.G., Terra, F.D.S, Dazio, E.M.R., Felipe, A.O.B. & Fava, S.M.C.L. 2018. Knowledge of the primary health care nurses about diabetes mellitus. *Journal of Nursing,* 12(1), pp. 179-188.

Pavelin, K., Pundir, S. & Cham, J. A. 2014. Ten simple rules for running interactive workshops. *PLoS Computational Biology,* 10(2), pp. 1-10.

Penjvini, S. & Shahsawari, S. S. 2013. Comparing problem based learning with lecture based learning on medicine giving skill to newborn in nursing students. *Journal of Nursing Education and Practice,* 3(9), pp. 53-59.

Pheiffer, C., Pillay-Van Wyk, V.P., Joubert, J.D., Levitt, N., Nglazi, M.D. & Bradshaw, D. 2018. The prevalence of type 2 diabetes in South Africa: a systematic review protocol. *British Medical Journal Open,* 8(1), pp. 1-4.

Pickles, K., Ivanusic, J. J., Xiao, J., Durward, C., Ryan, A.B. & Hayes, J.A. 2018. Peer tutoring for anatomy workshops in Cambodia. *Anatomical Sciences Education,* 10(4), pp. 1-8.

Pithon, M. 2013. Importance of the control group in scientific research. *Dental Press Journal of Orthodontics,* 18(6), pp. 1-5.

Polit, D.F. & Beck, C.T. 2017. *Nursing research: Generating and assessing evidence for nursing practice.* 10th ed. Philadelphia: Lippincott Williams & Wilkins.

Pol, J.V.D., Volman, M., Oort, F. & Beishuizen, J. 2015. The effects of scaffolding in the classroom: support contingency and student independent working time in relation to student achievement, task effort and appreciation. *Instructional Science,* 43(1), pp. 616-641.

Pols, A.D., Schipper, K., Overkamp, D., Van Marwijk, H.W.J., Van Tulder, M.W. & Adriaanse, M.C. 2018. Patients' and practice nurses' perceptions of depression in patients with Type 2 diabetes and/or coronary heart disease screened for subthreshold depression. *BMC Family Practice,* 2018(19), p. 1-14.

Qaseem, A., Barry, M.J., Humphrey, L.L. & Forciea, M.A. 2017. Oral pharmacologic treatment of type 2 diabetes mellitus: A clinical practice guideline update from the American College of Physicians. *Annals of Internal Medicine,* 166(4), pp. 279-290.

Quinn, M.M., Smith, T., Kalmar, E.L. & Burgoon, J.M. 2018. What type of learner are you? Preferred learning styles of undergraduate gross anatomy students according to the index of learning styles questionnaire. *Anatomical Sciences Education,* 11(1), pp. 358-365.

Reid, M., Walsh, C., Raubenheimer, J., Bradshaw, M., Pienaar, M., Hassan, C., Nyoni, C. & Le Roux, M. 2018. Development of a health dialogue model for patients with diabetes: A complex intervention in a low/middle-income country. *International Journal of Africa Nursing Sciences,* 8(1), pp. 122-131.

Reiter, B. 2017. Theory and methodology of exploratory social science research. *International Journal of Science and Research Methodology*, 5(4), pp. 129-150

Republic of South Africa. 2006. *Nursing Act. Act No. 33 of 2005.* Government Gazette. Vol. 291(29), May. No. 28883. Pretoria: Government Printer. https://www.sanc.co.za/pdf/Nursing%20Act%202005.PDF

Roach, K., Tilley, E. & Mitchell, J. 2018. How authentic does authentic learning have to be?. *Higher Education Pedagogies,* 3(1), pp. 495-509.

Roets, L., Botma, Y. & Grobler, C. 2016. Scholarship in nursing: Degree-prepared nurses versus diploma-prepared nurses. *Health SA Gesondheid,* 21(1), pp. 422-430.

Rosenkranz, S., Abbott, P., Reath, J., Gunasekera, H. & Hu, W. 2012. Promoting diagnostic accuracy in general practitioner management of otitis media in children: findings from a multimodal, interactive workshop on tympanometry and pneumatic otoscopy. *Quality in Primary Care,* 20(1), pp. 275-285.

Saldert, C., Forsgren, E. & Hartelius, L. 2016. Teaching medical students about communication in speech-language disorders: Effects of a lecture and a workshop. *International Journal of Speech-Language Pathology,* 18(1), pp. 571-579.

Sami, W., Ansari, T., Butt, N.S. & Hamid, M.R.A. 2017. Effect of diet on type 2 diabetes mellitus: A review. *International Journal of Health Sciences,* 11(2), pp. 65-71.

Saunders, M., Lewis, P. & Thornhill, A. 2012. *Research methods for business students.* 6th ed. Harlow: Pearson Education.

Schaubhut, R.M. & Gentry, J.A. 2010. Nursing preceptor workshops: Partnership and collaboration between academia and practice. *The Journal of Continuing Education in Nursing,* 41(4), pp. 155-160.

Sertel, A. & Yucel, B. 2015. The methods of teaching course based on constructivist learning approach: An action research. *Journal of Education and Training Studies,* 3(6), pp. 248-270.

Shen-Miller, D. & Smiler, A.P. 2015. Men in female-dominated vocations: a rationale for academic study and introduction to the special issue. *Sex Roles Journal,* 72(7), pp. 269-276.

Shetty, N. & Swapnika, S. 2017. KAP study on diabetic retinopathy amongst the paramedic nursing students. *Indian Journal of Clinical and Experimental Ophthalmology,* 3(1), pp. 85-90.

Siddiqui, S. 2018. Obesity and diabetes: interrelationship. *Advances in Obesity Weight Management and Control,* 8(2), pp. 155-158.

Simundic, A. 2013. Bias in research. *Journal of Croation Society of Medical Biochemistry and Laboratory Medicine,* 23(1), pp. 12-15.

Smithikrai, C. 2016. Effectiveness of teaching with movies to promote positive characteristics and behaviours. *Procedia Social and Behavioural Sciences,* 217(1), pp. 522-530.

Smyth, S. 2017. *Andragogy: Adult learning theory (Knowles) in learning theories.* [Online] Available at: https://www.learning-theories.com/andragogy-adult-learning-theory-knowles.html
[Accessed 26 May 2019].

So, J.Y., Chen, P.P., Wong, G.K.C. & Chan, T.T.N. 2019. Simulation in medical education. *Journal of Royal College Physicians,* 49(1), pp. 52-57.

Sogunro, O.A., A. 2015. Motivating factors for adult learners in higher education. *International Journal of Higher Eduaction,* 4(1), pp. 22-37.

Speziale, H. & Carpenter, D. 2007. *Qualitative research in nursing.* 4th ed. Philadelphia: Lippincott Williams and Wilkins.

Subhashinie, S., Ekanayake, S. & Wanigatunge, C. 2016. Dietary habits of type 2 diabetes patients: Variety and frequency of food intake. *Journal of Nutrition and Metabolism,* 2016(1), pp. 1-6.

Suhendi, A. & Purwarno, P. 2018. Constructivist learning theory: The contribution to foreign language and teaching. In M. Purwarno, A. Suhendi, P. Siwi & S. Ekalestari (Eds). *The 1st Annual International Conference on Language and Literature (AICLL)*. Medan, Indonesia: KNE Publishing. pp. 87-95.

Tayob, S., Bezuidenhout, S. & Helberg, E. 2014. Challenges in the management of medicine supply in primary health care centres in a district of Gauteng province, South Africa. *African Journal for Physical, Health Education, Recreation and Dance,* 1(1), pp. 152-159.

Teich, T. & Riddell, M.C. 2016. The enhancement of muscle insulin-sensitivity after exercise: A Rac1-independent handoff to some other player?. *Endocrinology,* 157(8), pp. 2999-3001.

SANC (South African Nursing Council). 2018a. *Registrations and listed qualifications.* Pretoria: SANC.

SANC (South African Nursing Council). 2018b. *South African Nursing Council geographical distribution.* Pretoria: SANC.

SEMDSA (Society for Endocrinology Metabolism and Diabetes of South Africa) Type 2 Diabetes Guidelines Expert Committee. 2017. SEMDSA Guidelines for the management of Type 2 diabetes mellitus. *Journal of Endocrinology, Metabolism and Diabetes of South Africa,* 22(Supplement 1), pp. S1-S196.

Toledo, S. & Dubas, J.M. 2016. Encouraging higher-order thinking in general chemistry by scaffolding student learning using Marzano's taxonomy. *Journal of Chemical Education,* 93(1), pp. 64-69.

Trajkovski, S., Schmied, V., Vickers, M. & Jackson, D. 2015. Using appreciative inquiry to bring neonatal nurses and parents together to enhance family-centred care: A collaborative workshop. *Journal of Child Health Care,* 19(2), pp. 239-253.

Tryaki, O. & Cinar, N. 2016. Management of continuous positive airway pressure in the newborn: Impact of lecture-based interactive workshops on training for neonatal intensive care nurses. *Aquichan,* 16(2), pp. 159-168.

Tshililo, A., Mangena-Netshikweta, L., Nemathaga, L. & Maluleke, M. 2019. Challenges of primary healthcare nurses regarding the integration of HIV and AIDS services into primary healthcare in Vhembe district of Limpopo province, South Africa. *Curationis,* 42(1), pp. 1-6.

Udogadi, N.S., Onyenibe, N.S. & Abdullahi, M.K. 2019. Dietary management of diabetes mellitus with focus on Nigeria. *International Journal of Diabetes Research,* 2(1), pp. 26-32.

University of Kansas. 2016. *Conducting a workshop.* [Online]
Available at: http://ctb.ku.edu/en/table-of-contents/structure/training-and-technical-assistance/workshops/main
[Accessed 4 January 2017].

University of Kansas, 2018. *Center for Community Health and Development.* [Online]
Available at: https://www.communityhealth.drupal.ku.edu/ctb/overview
[Accessed 28 July 2019].

University of Queensland. 2018. *Constructive alignment.* Brisbane: University of Queensland.

University of Southern California. 2017. *Types of research designs.* [Online] Available at: http://libguides.usc.edu/writingguide/researchdesigns [Accessed 24 September 2017].

Van Rensburg, H.C.J. 2014. South Africa's protracted struggle for equal distribution and equitable access – still not there. *Human Resources for Health,* 12(26), pp. 1-16.

Viguiliouk, E., Jenkins, A.L., Mejia, S.B., Sievenpiper, J.L. & Kendall, C.W.C. 2018. Effect of dried fruit on postprandial glycemia: a randomized acute-feeding trial. *Nutrition and Diabetes,* 8(59), pp. 1-9.

Visagie, S. & Schneider, M. 2014. Implementation of the principles of primary health care in a rural area of South Africa. *African Journal of Primary Health Care Family Medicine,* 6(1), pp. 2-10.

Vygotsky. 1978. *Mind in society: The development of higher psychological processes.* 1st ed. Cambridge, MA: Harvard University.

Waheida, S., Elshemy, M. & Basal, A. 2015. Effect of educational program about foot care on nurses' knowledge, practice and outcomes for patients with diabetes. *Journal of Nursing and Health Science,* 4(6), pp. 67-77.

Watkins, A. 2019. Knowledge retention: 7 proven strategies for healthcare educators. *Ausmed*. [Online] Available at https://www.ausmed.com/cpd/articles/knowledge-retention. [Accessed 25 November 2019].

West, E.A. 2016. Constructivist theory and concept-based learning in professional nursing ethics: Implications for nurse educators. *Teaching Ethics,* 161(1), pp. 121-130.

Wharton, S., Pedersen, S.D., Lau, D.C.W. & Sharma, A.M. 2018. Weight management in diabetes. *Canadian Journal of Diabetes,* 42(1), pp. S124-S129.

Wilkhamn, B.R. 2016. Challenges of adopting constructive alignment in action learning education. *Action Learning Research and Practice,* 14(1), pp. 18-28.

Woods, A.D. 2016. *Nursing students' achievement using scaffolding case studies in the blended learning environment.* Doctoral dissertation. Tuscaloosa, Alabama: University of Alabama.

World Conferences on Research Integrity. 2010. *Singapore Statement on research Integrity.* [Online]
Available at: https://wcrif.org/guidance/singapore-statement
[Accessed 6 June 2018].

WHO (World Health Organization). 1978. *Declaration of Alma-Ata: International Conference on Primary Health Care, Alma-Ata.* Alma-Ata, World Health Organization.

WHO (World Health Organization). 2015. *World health statistics 2015,* Geneva: World Health Organization.

World Health Organization. 2016. *Global report on diabetes,* Geneva: World Health Organization. https://apps.who.int/iris/bitstream/handle/10665/204871/9789241565257_eng.pdf;jsessionid=FAEADC564481A960372DBD65B05F30BD?sequence=1

World Health Organization. 2017. *Complication prevention for patients with diabetes,* Manila: World Health Organization Regional Office for Western Pacific Region.

World Health Organisation. 2018a. *Health workforce.* [Online]
Available at: http://www.who.int/hrh/professionals/en/
[Accessed Friday 5 May 2018].

WHO (World Health Organization). 2018b. *Newsroom.* [Online]
Available at: https://www.who.int/news-room/fact-sheets/detail/diabetes
[Accessed 18 June 2019].

WHO (World Health Organization), 2019. *Health topics: Primary health care.* [Online]
Available at: https://www.who.int/health-topics/primary-health-care#tab=tab_1
[Accessed 26 November 2019].

Wu, C.Y., Lin, Y.Y., Yeh, M.C., Huang, L. H., Chen, S.J., Liao, S.C. & Lee, M.B. 2014. Effectiveness of interactive discussion group in suicide risk assessment among general nurses in Taiwan: A randomized controlled trial. *Nurse Education Today,* 34(1), pp. 1388-1394.

Yamazaki, A., Tsumura, A., Mine, H., Kimura, C., Soeda, A., Odatsu, K. & Kiwado, W. 2017. Feasibility and short-term impact of the “case study in-house group training program for family nursing” at medical facilities. *International Journal of Nursing Practice.,* 23(1), pp. 1-7.

Yang, X., Darko, K. O., Huang, Y., He, C., Yang, H., He, S., Li, J., Hocher, B. & Yin, Y. 2017. Resistant starch regulates gut microbiota: Structure, biochemistry and cell signalling. *Cellular Physiology and Biochemistry,* 42(1), pp. 306-318.

Zaider, T.I., Banerjee, S.C., Manna, R., Coyle, N., Pehrson, C., Hammonds, S. & Krueger, C.A. 2016. Responding to challenging interactions with families: A training module for inpatient oncology nurses. *Journal of Families, Systems and Health,* 34(3), pp. 204-212.

Zimmerman, R. 2016. *Disease management.* Cleveland Clinic Center for Continuing Education. [Online]
Available at: https://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/endocrinology/diabetes-mellitus
[Accessed 27 July 2019].

ADDENDUM A: ETHICAL CLEARANCE

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
HEALTH SCIENCES
GESONDHEIDSWETENSKAPPE

IRB nr 00006240
REC Reference nr 230408-011
IORG0005187
FWA00012784

28 June 2017

MUKURUNGE EVA
SCHOOL OF NURSING
IDALIA LOOTS BUILDING
UFS

Dear Mukurunge Eva

HSREC 113/2016 B (UFS-HSD2017/0640)
SUPERVISOR: DR M REID
PROJECT TITLE: FEASIBILITY OF INTERACTIVE DIABETES WORKSHOPS FOR PRIMARY HEALTH CARE NURSES IN A FREE-STATE SUB-DISTRICT

1. You are hereby kindly informed that the Health Sciences Research Ethics Committee (HSREC) approved this protocol after all conditions were met.
2. The Committee must be informed of any serious adverse event and/or termination of the study.
3. Any amendment, extension or other modifications to the protocol must be submitted to the HSREC for approval.
4. A progress report should be submitted within one year of approval and annually for long term studies.
5. A final report should be submitted at the completion of the study.
6. Kindly use the **HSREC NR** as reference in correspondence to the HSREC Secretariat.
7. The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act. No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2006); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; The International Conference on Harmonization and Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH Tripartite), Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

Yours faithfully

.....
PROF WJ STEINBERG
VICE CHAIR: HEALTH SCIENCES RESEARCH ETHICS COMMITTEE

Health Sciences Research Ethics Committee
Office of the Dean: Health Sciences
T: +27 (0)51 401 7795/7794 | F: +27 (0)51 444 4359 | E: ethicsfhs@ufs.ac.za
Block D, Dean's Division, Room D104 | P.O. Box/Posbus 339 (Internal Post Box G40) | Bloemfontein 9300 | South Africa
www.ufs.ac.za

ADDENDUM B: APPROVAL LETTER FROM THE FREE STATE DEPARTMENT OF HEALTH

health
Department of Health
FREE STATE PROVINCE

Ms Eva Makurunge
School of Nursing
Idalia Loots Building
University of the Free State

Dear Ms Makurunge

SUBJECT: PERMISSION FOR MS E MUKURUNGE TO CONDUCT A STUDY ON FEASIBILITY OF INTERACTIVE DIABETES WORKSHOPS FOR PRIMARY HEALTH CARE NURSES IN A FREE STATE SUB DISTRICT

The above mentioned subject and attached correspondence approved by the HOD bears reference.

Kindly note that permission is hereby granted for Ms E Makurunge to conduct a research on the above mentioned subject at the following facilities reporting under Mangaung Metro District:

Thaba Nchu Local Area

- Mafane Clinic
- Gaongalelwe Clinic
- Mokoena Clinic
- Thaba Nchu Clinic
- Dinaane Clinic

Botshabelo Local Area

- Molefi Tau Clinic
- Winnie Mandela Clinic
- Jazzman Mokhothu Clinic
- Maletsatsi Mabaso Clinic
- TS Mahloko Clinic

Trust you will find the above in order,

Kind regards

MS NJ RAMAROU-MAKHOALI
DISTRICT MANAGER: MANGAUNG METRO

Ms NJ Ramarou-Makhoali
District Manager
Mangaung Metro

DATE: 05.10.18

Me. NJ Ramarou-Makhoali
District Manager: Mangaung Metro (FSDOH)
FSPC Building, Bloemfontein; 9300
Tel: (051) 447 2194; E-mail: MakhoaliNJ@fshealth.gov.za

ADDENDUM C: INFORMATION BROCHURE FOR BOTSHABELO PARTICIPANTS

Title of the study: Feasibility of interactive diabetes workshops for Primary Health Care nurses in a Free State sub-district

Good day

I, Eva Mukurunge, am doing research on the feasibility of interactive diabetes workshops for primary health care nurses in a Free State sub-district.

Research is the process to learn the answer to a question. The study seeks to determine the feasibility of interactive diabetes workshops for primary health care nurses in a Free State sub-district.

Invitation to participate: We are asking/inviting you to participate in a research study.

What is involved in the study – You will be expected to complete two questionnaires. The researcher will give you the first questionnaire to complete and after a week, you will be given a second questionnaire to complete. Each questionnaire will not take longer than 15 minutes to complete.

Risks of being involved in the study: There are no risks involved.

Benefits of participating in the study. You will not be paid to participate in the study, but it is anticipated that you will benefit from better service provision at the clinic should information obtained during this study be incorporated in service provision.

Participation is voluntary, and refusal to participate will involve no penalty or loss of benefits to which the participant is otherwise entitled; the participant may discontinue

participation at any time without penalty or loss of benefits to which the participant is otherwise entitled.

Confidentiality: Efforts will be made to keep personal information confidential, since participants' data will be coded and not traceable to specific individuals. Results obtained from this study may be presented on academic platforms, again only reflecting data obtained from all participants as a group and not on an individual basis.

However, absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law.

Contact details of researcher – for further information contact the researcher on:

Eva Mukurunge (00266 50912330)

Contact details of REC Secretariat and Chairperson: Ethics Committee of the Faculty of Health Sciences, University of the Free State – for reporting of complaints/problems:

Telephone number (051) 4052812

ADDENDUM D: INFORMATION BROCHURE FOR THABA NCHU PARTICIPANTS

Title of the study: Feasibility of interactive diabetes workshops for Primary Health Care nurses in a Free State sub-district

Good day

I, Eva Mukurunge, am carrying out a research on the feasibility of interactive diabetes workshops for Primary Health Care nurses in a Free State sub-district.

Research is a process of learning answers to a question. Therefore, this research study seeks to determine the feasibility of interactive diabetes workshops for primary health care nurses in a Free State sub-district.

Invitation to participate: We are inviting you to participate in a research study.

What is involved in the study – You will be expected to complete three questionnaires and attend a workshop. The first questionnaire on diabetes, will be completed before attending the workshop. The workshop will be presented at a time that is suitable for all nurses from the clinic. During the workshop, diabetes related issues will be discussed in an interactive way. The workshop will not last longer than an hour. On completion of the workshop, you will complete two questionnaires. The first is a short questionnaire indicating whether you benefited from the type of activities during the workshop. The second questionnaire is the same as the one that you filled before the workshop. Each questionnaire will not take longer than 15 minutes to complete.

Risks of being involved in the study: There are no risks involved.

Benefits of participating in the study. There is no payment for participation in the study, but it is anticipated that your knowledge of diabetes management will be enhanced during the workshop.

Participation is voluntary, and refusal to participate will involve no penalty or loss of benefits to which the participant is otherwise entitled; the participant may discontinue participation at any time without penalty or loss of benefits to which the participant is otherwise entitled.

Confidentiality: Efforts will be made to keep personal information confidential, since participants' data will be coded and not traceable to specific individuals. Results obtained from this study may be presented on academic platforms, again only reflecting data obtained from all participants as a group and not on an individual basis.

However, absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law.

Contact details of researcher – for further information contact the researcher on:

Eva Mukurunge (00266 50912330)

Contact details of REC Secretariat and Chairperson: Ethics Committee of the Faculty of Health Sciences, University of the Free State – for reporting of complaints/problems:

Telephone number (051) 4052812

ADDENDUM E: CONSENT FORM

You have been asked to participate in a research study titled: Feasibility of interactive diabetes workshops for Primary Health Care nurses in a Free State sub-district

You have been informed about the study by ……

You may contact Eva Mukurunge on 00266 5091 2330 at any time if you have questions about the research or if you are injured as a result of the research. You may contact the Secretariat of the Ethics Committee of the Faculty of Health Sciences, UFS on telephone number (051) 4052812 if you have questions about your rights as a research participant.

Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or decide to terminate participation. If you agree to participate, you will sign this copy.

The research study, including the above information has been verbally described to me. I understand what my involvement in the study means and I voluntarily agree to participate.

_____ _____

Signature of Participant Date

ADDENDUM F: INTERACTIVE DIABETES WORKSHOP PROGRAMME

INTERACTIVE DIABETES WORKSHOP PROGRAMME

TIME	OBJECTIVE	APPROACH TO USE	MATERIALS
07:30-07:35 (5 minutes)	Administration of the pretest	Participants take the pretest	The questionnaires
07:35-07:40 (5 minutes)	Introduction of the workshop and its aims	Handout	
07:40-07:50 (10 minutes)	Diabetics should eat small regular meals.	Participants should make a drawing of a plate to show the proportions of food types to be eaten by diabetic patients. Discuss in the big group the rationale behind their choice of foods	Markers Flip charts
07:50-07:55 (5 minutes)	Diabetics should aim to walk fast for at	Music of different tempo is played and participants walk according to the tempo and they identify which one best suits the fast walking.	Laptop with music

TIME	OBJECTIVE	APPROACH TO USE	MATERIALS
	least 30 minutes on most days	Participants go back to the big group to discuss: what needs to be checked before and after the fast walk; and the benefits of fast walking	
07:55-08:00 (5 minutes)	Diabetics should lose weight as prescribed	Participants are given a case scenario which describes the weight and height of a diabetic patient; and their waist circumference who has visited the clinic for their medication refill. The patient is worried about their weight and would like to lose weight. Participants have to identify the BMI and give health education on how to manage their weight. Group Discussion	The scenario.
08:00-08:10	Diabetes can be controlled and	Case scenario: A person with a non-healing ulcer on the big toe; does not understand importance of administration of insulin as prescribed; who has had	The scenario.

TIME	OBJECTIVE	APPROACH TO USE	MATERIALS
10 minutes	complications prevented. Medication must be taken as prescribed	visual problems in the past three months; he is always hungry and thirsty and has frequent urination. Participants are to identify the problems of the patient in the scenario and role-play how they would give health education as management of the patient.	
08:10-08:15 (5 minutes)	Diabetics can enjoy a normal life	Case scenario: A diabetic man with fears of sexual impotence, stigmatization and failure to support his family is presented. In groups, participants are to discuss how to help the man lead a normal life. Groups to share their suggestions in the bigger group.	The scenario
08:15-08:20 (5 minutes)	Administration of the posttest	Participants take the posttest	Questionnaires
08:20-08:25 (5 minutes)	Evaluation of the workshop	Participants fill in the Likert scale	Evaluation forms

TIME	OBJECTIVE	APPROACH TO USE	MATERIALS
08:25-08:30 (5 minutes)	• Vote of thanks and participants depart		

ADDENDUM G: PRETEST/POSTTEST

Participant code: …….

SECTION A: DEMOGRAPHIC DATA

In this section mark with an "X" the most appropriate box and fill in the information that is required where is necessary.

1. Indicate your gender	MALE		FEMALE		
2. How old are you?	20 – 30 years	31 – 40 years	41-50 years	51-60 years	61-70 years
3. Are you currently employed as a	Registered nurse	Enrolled nurse	Auxiliary nurse		
4. What is your highest level of education?	Certificate	Diploma	B. Degree		
5. Did you have any specific training on how to provide care and support to a diabetic patient after the completion of your basic nursing qualification?	YES		NO		

6. If your answer is yes, state the main content of the training and indicate the year you received the training.
   ……
   ……
   ……
   ……
   ……
   ……
   ……

SECTION B:

For each of the statements below tick the most appropriate response.

QUESTIONS	True	False	Unsure
1. In order to avoid foot ulcers people with diabetes should wear shoes with pointed tips.			
2. People with diabetes need regular eye check-ups to prevent or delay onset of diabetic retinopathy.			
3. Brisk walking daily for 30 minutes is good for lowering blood glucose levels.			
4. Exercise increases glucose uptake by the muscles and insulin sensitivity.			
5. Weight loss in obese diabetes patients can improve blood glucose levels.			
6. Poor control of blood glucose can lead to loss of sensation in the periphery.			
7. Meals for people with diabetes should be small and frequent.			
8. People with diabetes should eat unrefined carbohydrates like whole-wheat grains, vegetables and fruits.			
9. Insulin is the first line drug of choice in type 2 diabetes.			
10. Insulin administered in an overused site will be absorbed faster.			
11. Depression is common in patients with diabetes.			
12. With a lot of support from family and healthcare professionals, people with diabetes can cope with the demands of diabetes.			

ADDENDUM H: THE LIKERT SCALE

WORKSHOP EVALUATION FORM

Participant code: ……..

Date:	
Workshop Location:	
Presenter:	

Please note: This form is for evaluation purposes so that we can improve our workshops. All responses will be treated with high confidentiality.

Please respond to the following statements by using the 5- point rating scale to indicate the extent to which you agree or disagree with each statement. Please circle the number that applies. The scale is from 5 to 1 as shown below:

5= strongly agree 4= Agree 3= Neutral 2= disagree 1= strongly disagree

Workshop objectives were stated clearly and met	5 4 3 2 1
The interactive activities were engaging	5 4 3 2 1
The workshop was well organised	5 4 3 2 1
The information and/or skills presented were relevant	5 4 3 2 1
The presenter provided adequate time for questions and answered them satisfactorily.	5 4 3 2 1
The workshop increased my knowledge and skills of diabetes	5 4 3 2 1
Instructions given during the workshop were clear	5 4 3 2 1
The pace of the workshop was appropriate	5 4 3 2 1

The physical arrangements were adequate	5 4 3 2 1

Comments/ suggestions

……

……

……...

Your feedback is sincerely appreciated. Thank you.

ADDENDUM I: SIGNED CONTRACT BETWEEN EVA MUKURUNGE AND SUPERVISOR (DR. M. REID)

POST-GRADUATE STUDENT AND SUPERVISOR AGREEMENT:
FACULTY OF HEALTH SCIENCES
UNIVERSITY OF THE FREE STATE

In a context of academic freedom and within a framework of individual autonomy and the pursuit of knowledge, this agreement is written in the belief that there is a reciprocal relationship and mutual accountability between supervisor and student.

(With acknowledgement to the University of the Witwatersrand: Statement of Principles for Postgraduate Supervision)

The supervisor and the student will:

1. Establish agreed roles and clear processes to be maintained by both parties. In the case of joint supervision, the role of every participant must be clarified.
2. Meet regularly and as frequently as is reasonable to ensure steady progress towards the completion of the proposal, research report, dissertation or thesis.
3. Keep appointments, be punctual and respond timeously to messages, and keep one another informed of any planned vacations or absences as well as changes in his/her personal circumstances that might impact on the work schedule. Unplanned absences or delays should be discussed as soon as possible and arrangements should be made to catch up lost time.
4. Ensure that research on animal or human subjects is conducted according to the procedures and the requirements of, and will prepare progress reports for the attention of the relevant University Ethics committee.

EM

5. Discuss and decide on the publication of the results:

When will the draft manuscript be available for publication? (Please indicate with X)

(a)	Before submission	
(b)	At submission	
(c)	Three months after submission	
(d)	Six months after submission	✓

Before the commencement of a project, there must be a clear written agreement entered into with a postgraduate student, which states that a concept manuscript will be prepared within six months after the final completion of the report/script/dissertation. Should the student not present a concept manuscript within this time, the study leader becomes the first author and the student the second author.

The supervisor will:

1. Assist with the construction of a written time schedule outlining the expected completion dates of successive stages of the work.
2. Provide guidance for the research project in relation to the design and scope of the project, the relevant literature and information sources, research methods and techniques and methods of data analysis.
3. Be accessible to the student and will be prepared for meetings with the student. This includes being up to date on the latest work in his/her area of expertise.
4. Provide written comments, either in summarised form or annotated in the document, within a timeframe jointly agreed upon at the outset of the research – suggested time is two (2) weeks.
5. Provide advice that can help the student to improve his/her writing; provide guidance on technical aspects of writing, such as referencing, as well as on discipline-specific requirements – however, detailed correction of drafts and instruction in aspects of language and style are not the responsibility of the supervisor.
6. Advise the student in the production of a research report, dissertation or thesis - provision should be made for adequate, mutually respectful discussion of the recommendations.
7. Ensure that the student has the opportunity to present work at postgraduate / staff seminars / national / international conferences as appropriate.
8. Assist with the publication of research articles as appropriate.

E.M

9. Discuss the ownership of research conducted by the student in accordance with the University / Faculty guidelines and rules on intellectual property, co-authorship and copyright.
10. Inform the student that the research is to be conducted in accordance with the plagiarism policy of the University / Faculty.
11. Ensure that the student is made aware in writing of the inadequacy of progress and/or of any work where the standard is below par – acceptability will be according to criteria previously supplied to the student.
12. Have a right to refuse to allow the submission of sub-standard work for examination, regardless of the circumstances; if the student chooses to submit without the consent of the supervisor, this should be clearly recorded and the appropriate procedures followed.

The student will:

1. Undertake to work independently under the guidance of the supervisor – this includes reading widely to ensure that the literature pertaining to his/her chosen topic has been identified and consulted.
2. Be obliged to make appointments to see the supervisor and will arrange meeting times well in advance.
3. Consider carefully how to derive maximum benefit from these contact sessions by determining what he/she wants from these sessions.
4. Submit written work for discussion with the supervisor well in advance of the scheduled meetings – the type and frequency of written work should be agreed upon with the supervisor at the outset of the research, or as decided at the previous meeting.
5. Submit written work that is relatively free of basic spelling mistakes, incorrect punctuation and grammatical errors; responsibility for the accuracy of language, the overall structure and coherence of the final research report, dissertation or thesis rests with the student.
6. Heed the advice given by the supervisor and engage in discussion regarding suggestions made – ultimately the student must take responsibility for the quality and presentation of the work.
7. Strive, within reasonable bounds, to maintain a focus on his/her research area and work within the agreed time schedule.
8. Prepare material for presentations at seminars and conferences.
9. Honour agreements regarding ownership of the research in accordance with the guidelines of the University and rules in relation to co-authorship, copyright and intellectual property.

EM.

10. Ensure that the work contains no instances of plagiarism, that all citations are properly referenced, and that the list of references is accurate, complete and consistent.
11. Work in accordance with the criteria of acceptability as supplied by the supervisor.
12. Not place the supervisor under undue pressure to submit work for examination until the supervisor is satisfied that it has reached an acceptable level of quality.

Signed at: PARAY SCHOOL OF NURSING

On this 12th day of MAY 20 17

Signature

EVA MUKURUNGE
Name of student

20150780 70
Student number

Signature

Dr M. Reid
Name of study leader / ~~promoter~~
(cross out where not applicable)

ADDENDUM J: DECLARATION BY LANGUAGE EDITOR

Declaration

6 January 2020

Hester Sophia Human
PO Box 4
Otjiwarongo
Namibia

Student: Eva Mukurungi

Thesis: feasibility of interactive diabetes workshops for primary health care nurses in a Free State sub-district

I confirm that I edited this thesis, audited the references, and made recommendations for changes to the text.

Hettie Human
WRITER | EDITOR | TRANSLATOR | INTERPRETER
+264 813 359 120 | hettie.human@gmail.com

ADDENDUM K: TURNITIN REPORT

FEASIBILITY OF INTERACTIVE DIABETES WORKSHOPS FOR PRIMARY HEALTH CARE NURSES IN A FREE-STATE SUB-DISTRICT

ORIGINALITY REPORT

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