The effects of teaching strategies on Saudi nursing students' critical thinking and academic performance: introducing PBL elements into a traditional course

A thesis submitted to the University of Sheffield in partial fulfilment of the requirements for the degree of

Doctor of Philosophy

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July 2012

Declaration

This written thesis is my own unaided work

Signed.........█████████████████████████.....................

Date..............6th July 2012...

Abstract

This study was built on the hypothesis that critical thinking is important for nursing education and practice. The literature suggested that problem based learning (PBL) is an effective strategy for developing critical thinking skills and other important skills for nursing students such as interpersonal skills, problem solving, self-directed learning, knowledge retention, bridging the gap between theory and practice, time management, and responsibility.

The aim of this study was to examine whether introducing PBL elements to a traditional teaching course affects students' critical thinking dispositions and academic performance, and to explore students' perceptions of implementing the PBL elements to their Critical Care Nursing course and their perceptions of traditional teaching methods. This study used a mixed methods approach, in which a quasi-experimental study was augmented by a qualitative approach. The California Critical Thinking Disposition Inventory (CCTDI) was used to collect pre- and post-test quantitative data, whilst qualitative data were gathered from students' reflective journals, field notes, observation of class sessions, and group discussions.

Sixty-eight third year nursing students at King Abdul Aziz University Nursing School participated in this study. Students were distributed randomly between an intervention group and a control group. The quantitative findings indicated that the intervention group elevated their critical thinking disposition. Moreover, they ultimately demonstrated a higher critical thinking disposition than the control group. However, no significant differences were found between the mean GPA of each of the groups. The qualitative data showed that the intervention group was satisfied with implementing the PBL elements to their course;

although mentioning some limitations such as the work being time-consuming and applying more loads on students. Students' reflections on the traditional approach indicated that they were not satisfied with this approach.

Dedication

This thesis is dedicated to

My Father

Farraj Aljohani

'Allah's mercy upon him'

For his love, care, trust, and everything he did to make sure that I reached this level one day.

My Mother

Khadija Alhaidari

For her patience, love, and care.

My Sisters

Ward, Maha, Noura, and Maram

For their support and bringing happiness to my life.

My Brothers

Abdulla, Abdul-Aziz, Khalid, and Ammar

For their trust and support.

Acknowledgements

My initial thanks go to God for enabling me to go through this journey and conduct this research.

I would like to show my gratitude to my supervisors, Dr. Tony Blackett, Prof. Roger Watson, and Dr. Tony Ryan, for their patient encouragement, support and insightful feedback throughout this experience. Without their help, this thesis would not have been possible.

My thanks go to Prof. Karen Holland for her valuable feedback and suggestions.

I owe a special thank you to all my friends for their care and support.

Thanks also go to King Abdul Aziz University Nursing School administration and faculty.

Finally, I would like to thank the nursing students who participated in this research. Without their participation and views this research would not have been possible.

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Abbreviations

Abbreviation	Description
Analy	Analyticity
ANOVA	Analysis of Variance
ARDS	Acute Respiratory Distress
CCTDI	California Critical Thinking Disposition Inventory
CCTST	California Critical Thinking Skills Test
CCTT	Cornell Critical Thinking Test
Confid	Confidence
End of semester RJ	End of semester reflective journal
GPA	Grade Point Average
Inquisi	Inquisitiveness
Matur	Maturity
MOHE	Ministry of Higher Education
NCLEX	National Council Licensure Examination
Openmin	Open-mindedness
PBL	Problem Based Learning
RCT	Randomised Controlled Trial
RJ	Within semester reflective journal
SCHS	Saudi Commission for Health Specialities
SCPR	Social and Community Planning Research Institute
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
SR	Saudi Riyals
System	Systematicity
Truth	Truth-Seeking
WGCTA	Watson-Glaser Critical Thinking Appraisal
WHO	World Health Organisation

Thesis overview

This thesis consists of seven chapters:

Chapter 1 is the study background; it provides information about the context of the study and addresses the development in the educational and health care sectors in Saudi Arabia. The final section of this chapter discusses the significance of this study.

Chapter 2 is concerned with reviewing relevant literature.

Chapter 3 is the methodology and methods chapter and it is divided into three sections. The first section discusses the philosophical assumptions underpinning the selected methodology of this study; it highlights and discusses different research paradigms. The second section outlines different research approaches including quantitative, qualitative, and mixed methods. In addition, it discusses important issues about research rigour and validity. Finally, the third section presents the methodology used for the study; the research design, research aims, objectives and questions, data collection methods, data analysis, methods integration, ethical issues, and detailed information about the data collection process and the intervention of the PBL elements.

Chapter 4 explains the quantitative data analysis; this chapter presents data on the following:

- The demographic characteristics of the study's participants.

- The intervention and control groups' performance in the CCTDI before and after the intervention.

- Differences between the intervention and control group performances in the CCTDI before and after the intervention.

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- Comparing academic performance of both groups.

- The relationship between students' demographic data and their academic performance.

- The relationship between students' demographic data and critical thinking disposition.

- The relationship between students' academic performance and critical thinking dispositions.

Chapter 5 describes the qualitative findings. It explores the intervention group's perceptions of their experiences with the traditional teaching approach alone and with introducing the PBL elements to their traditional course. The chapter consists of the following topics:

- Satisfaction

- Effects on emotional wellbeing

- Learning outcome

- Assessment methods

- Reflection on clinical practice.

Chapter 6 brings together qualitative and quantitative data analysis findings. It explores significant data emerging from quantitative data analysis in the light of qualitative data.

Chapter 7 is the discussion and conclusion, where significant findings derived from this research will be discussed and reflected on in the light of applicable literature; followed by a conclusion, study limitations and recommendations for future practice.

Chapter 1: Introduction

1.1. Saudi Arabia: the context of the study

The Kingdom of Saudi Arabia is an independent country within the Middle East. It was formally created in 1932; its land area is approximately 772,000 square miles, and it occupies most of the Arabian Peninsula. It borders Jordan, Iraq and Kuwait from the north side and Qatar, Oman, United Arab Emirates and Yemen from the south. The Red Sea forms the western border and the Arabian Gulf forms the eastern border. The official language in Saudi Arabia is Arabic (Long, 2005; Al-Osimy, 1994).

Islam originated in the area that is now Saudi Arabia. It is considered as an important land for Muslims around the world since it is a spiritual homeland where the two Holy cities are situated (Makkah and Medina). In Saudi Arabia, Islam is not considered only as a religion but also a way of life (Chai, 2005, p.5). It guides people's morals and behaviours such as clothing, food, and trading activities (Al-Osimy, 1994). Saudi Arabian law is derived from the Quran and referred to as 'Sharia' (Janin & Besheer, 2004). Saudi culture is formed of Islamic rules together with different Arabian customs (Bjerke & Al-Ameer, 1993).

Saudi Arabia is the world's biggest producer of oil, and oil is considered as the biggest economic income for the country (Bjerke & Al-Ameer, 1993; Chai, 2005). As a result of the massive growth of the oil trade, Saudi Arabia experienced rapid economic and social development. The Saudi society changed from being a 'rural, tribal' society to an 'urban-dwelling' society (Cordesman, 2003, p.6). Education has been developed and the literacy rate has increased (Wilson et al., 2004). About 97.5% of males and 94.5% of females enter

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elementary education. In addition, 88% of males and 72% of females enter high schools (WHO, 2006). Further details about the development of education will be discussed later.

The Saudi population has experienced dramatic growth since the 1970s. The total population was 6.8 million in 1973 (Cordesman, 2003); but, it had reached 23.89 million in the middle of 2007, with a yearly increase of 2.3%. The Saudi nationals currently form 72.9% of the total population and non-Saudis are about 27.1%. Moreover, 67.1% of the Saudi nationals are under the age of 30 years with 37.2% under the age of 15 (Ministry of Economy and Planning: Central Department of Statistics and Information, 2007)

1.2. The development of Saudi education

The first Saudi educational institute was established in the 1920s, immediately after King Abdul Aziz, the first King of Saudi Arabia, unified the country (Rugh, 2002; Alrawaf & Simmons, 1991). However, education was not formally recognised until the 1950s. After that, the Ministry of Education was established. Education was only provided for boys; girls' education commenced in 1959 (Rugh, 2002; Alrawaf & Simmons, 1991). School education received particular attention from the government and is free for all students (Al-Osimy, 1994). It has been categorised into three levels; six years elementary, three years intermediate, and three years secondary (Rugh, 2002).

In the late 1950s, university education was launched. The first university was established in 1957 in Riyadh and was named King Saud University: it remains the biggest university in Saudi Arabia (Alkhazim, 2003; Saleh, 1986). Ten years later in 1967, King Abdulaziz University was established in Jeddah by Saudi businessmen as a private institution; then, in

1971 it was converted to a public university (Mordechai, 1993). In the early 1980s, the number of universities increased to seven (Saleh, 1986).

When Saudi education was established, teaching was reliant on faculty members from foreign countries. Teachers were brought from Egypt and other Arab countries; their education strategy was described as a traditional 'pedagogical' style of education (Rugh, 2002). Moreover, Saudi individuals who were considered to be qualified to complete their education were sent to Egypt (Mordechai, 1993). This was the beginning of the educational development in Saudi Arabia.

1.3. Higher education challenges

According to Alkhazim (2003), Saudi higher education faces many challenges and problems. Universities are under pressure to find sufficient places for all prospective students. In 2000 and 2001, about 60,000 students were unable to gain admission to university and more than 25,000 students studied abroad on their own initiative. Yamani (2006) argued that, after the attack on the World Trade Centre in New York, there were increased limitations on issuing student visas to the USA. This has resulted in more pressure being applied to Saudi higher education institutes. Another issue has been that the Saudi education system does not fulfil the requirements of the employment market, in terms of either graduate quality or quantity. Alkhazim (2003) commented on the quality of university education and argued that it had no clear standards. Furthermore, he described the administrative system of higher education as being highly centralised. The evaluation of education in Saudi Arabia and other Gulf countries indicated that the education system has weaknesses; graduates are ineffective and training provided for education leaders is not of the required quality (Abouammoh, 2010).

To solve these problems, the government has developed a number of strategies. Private universities and colleges have been established (Yamani, 2006). From 1998 to 2009 the number of government universities dramatically increased from eight to twenty-one, in addition to six private universities and seventeen community colleges (Abouammoh, 2010). Abouammoh (2010) stated that Saudi Arabia and other Gulf countries have established many other solutions to help overcome their educational problems, namely:

- Training programmes have been implemented to help educators modify their teaching style

- Curriculums have been reformed

- Educational standards have been improved

- Quality assurance has been taken into consideration.

1.4. Health care services development

Health care has been the government's priority since the unification of the kingdom. The first step concentrated on general health services. In 1925, the General Health Directorate was created by King Abdul Aziz Al-Saud, and by 1951 there were 16 hospitals. After that, the General Health Directorate was converted into the Ministry of Health (MOH). 1954 was considered as the golden year for health development in the kingdom as at that time the MOH started to implement the plan of building general hospitals. In addition, the number of primary health clinics increased and many health care centres were developed. The system of free treatment and medication was implemented in all health care centres created by the Ministry (Al-Osimy, 1994; Ministry of Health, n.d.). Health care is not only provided by the MOH; there are other government agencies such as the National Guard and University Teaching Hospitals. Moreover, private sectors play an important role in delivering health care

in the country; they form 40% of the health services provided to the community (Aboul-Enein, 2002).

1.5. The development of nursing education in Saudi Arabia

The first Saudi nursing programme was started in 1958 in Riyadh by the MOH in collaboration with the World Health Organization (WHO), and was called the Health Institute Program. The students enrolled in this programme comprised 15 young men who held an elementary school certificate and the programme was for one year (Almalki et al., 2011; Al-Osimy, 1994). A women's nursing programme was established later, in 1961, in two health institutes, one in Jeddah and another in Riyadh. Both male and female programme entrants were required to complete only six years of elementary school before entering the nursing programme. Then, the nursing programme for females was extended to a three-year programme and the requirements for enrolment became completion of six years of elementary school and three years of intermediate school (El-Sanabary, 1993).

Diploma programmes were established in 1992, and were offered by colleges and health institutes operated by the MOH. The entry requirement for these programmes is a high school certificate (Aldossary et al., 2008). The Bachelor of Science in Nursing programme was established in 1976 by the Ministry of Higher Education (MOHE). This programme was situated in the King Saud University in Riyadh, and its curriculum was prepared by American experts who had been invited for that purpose (Phillips, 1989). In the following year, a similar programme was established in the King Abul Aziz University in Jeddah. The first cohort to join this programme comprised only six female students (Tumulty, 2001). The nursing programme at King Saud University came under the umbrella of Applied Medical Sciences in 1978 and was named as the Department of Nursing (Almalki et al., 2011).

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Another programme was initiated in the King Faisal University in Dammam in 1987 (Tumulty, 2001). Later in 2004, the Department of Nursing was converted into a College of Nursing. The admission requirement of nursing programmes remained as a high school certificate. Bachelor degree programmes were only for female students, until 2004 when university programmes were created for male students (Almalki et al., 2011).

Saudi Arabia established the first nursing Masters programme in Gulf countries; the programme was developed in 1987 at King Saud University (Almalki et al., 2011). The first PhD programme was established in 1994 at King Abdul Aziz University in collaboration with a number of British universities. This programme was for female candidates who could not study abroad (Abu-Zinadah, 2004). The governmental agencies had recently established nursing programmes to meet their own requirements. Such programmes are administered by the National Guard Health Affairs department, and the King Faisal Specialist Hospital and Research Centre. These are two-year programmes followed by six months of clinical training (Almalki et al., 2011; Aldossary et al., 2008). Rather than establish more of these educational programmes, the government approved the development of private educational programmes in response to the demands of the Saudi market for nurses (Almalki et al., 2011). These private programmes are divided into three categories: colleges, institutes and centres. Colleges provide nursing education; whilst private institutes and centres provide health training for nurses' assistants, ward clerks and other supporting staff (Abu-Zinadah, 2007; Tumulty, 2001). Colleges offer bachelor degrees in nursing, institutes provide diplomas in nursing and other health specialities; however, private institutes provide a certificate after the successful completion of a training programme that ranges from one month to a year (Almalki et al., 2011).

1.6. The Saudi Commission for Health Specialties (SCHS)

The SCHS was established in 1993 in response to developments in the quality and quantity of health care services; as well as the establishment of different educational and training programmes. The SCHS head office is situated in Riyadh and it has six branches distributed over different regions within the country (Saudi Commission for Health Specialities, n.d.). The SCHS has the following aims:

- Establishing, accrediting, and evaluating health training programmes

- Developing scientific boards to design training programmes

- Assessing and accrediting hospitals

- Evaluating and issuing examination results

- Assessing training certificates

- Encouraging health research and publications

- Organising health symposiums

- Applying standards for all health care professions

- Encouraging the development of scientific and professional health societies.

(Al-Freihi, 2003)

The SCHS provides licensure to all health professions and it also accredits all newly-developed educational and training programmes. Until now, the SCHS has accredited about 37 different training programmes (Saudi Commission for Health Specialities, n.d.). This institution is concerned with applying standards for the nursing profession and education; however, implementation is very sluggish (Tumulty, 2001). An example of changes applied is the assessment of all nursing certificate holders before employment. Saudi graduates and expatriate nurses have to complete a written exam which is designed in a form of multiple

choice questions, which evaluate the examinee's awareness of basic nursing practice. The main aim of this exam is to ensure that nurses can practice safely (Saudi Commission for Health Specialties, n.d.).

1.7. Description of King Abdul Aziz University Department of Nursing

The idea of establishing a nursing programme at King Abdul Aziz University came at the time of establishing a medical school within the University. The programme was established according to recommendations of a conference conducted in 1977 (Tayeb, 1994, as cited in King Abdul Aziz University, 1995). The programme was built on the following philosophy:

> 'Each human being is a uniqueness of mind, body and spiritual being and is dedicated to caring for human beings at any point of his life cycle. The Nursing Department prepares its graduates to care for human beings with respect for personal worth, dignity and feelings and recognizes rights and responsibilities. Academic excellence is promoted by encouraging sound judgement and critical thinking through integration of social, behavioural, and biological sciences. The Nursing Department believes the concepts of human beings; environment, health, and nursing are essential components of a nursing curriculum. Human beings are recognised as bio-psycho-social cultural and spiritual beings who develop within a multi-dimensional environmental field' (King Abdul Aziz University, 1995, p.15)

In 1982, the first cohort of nurses graduated from the university. Later in 1994, the programme was reviewed and redesigned to fulfil the requirements of the contemporary health care context within the kingdom. The nursing curriculum is taught through a five-year programme and all courses are taught in English. Before admission students must pass English language examinations (Simpson, 2002; King Abdul Aziz University, 1995).

Educators are specialised in different areas within nursing; including medical-surgical, critical care, maternity, paediatric, psychiatric and mental health, and community health. The college curriculum is described as follows.

1.7.1. First year:

The first year of the programme consists of the following courses: basic sciences, communication skills and English language.

1.7.2. Second year:

In the second year students study human sciences, sociology and psychology for nursing, health assessment, and basic concepts of professional nursing, which all aim to help students to learn the basic health care of patients.

1.7.3. Third and fourth years:

Those two years include more intensive nursing courses which are about human bio-physiological, social and psychological changes. Students are helped to interact with people in the clinical settings and community. The nursing process is the core of most courses; students are taught to set goals, apply priorities, implement care and evaluate it (King Abdul Aziz University, 1995).

1.7.4. Fifth year:

Nursing students' clinical practice is taken within different hospitals in Jeddah city. During practice students are supervised by the nursing faculty. The fifth year of the programme is the internship year where students practise in different areas within the hospital. After the successful completion of this year, students will be awarded a BSN degree (Bachelor of

Science in Nursing). Graduates can then be employed in different health care sectors within the kingdom (King Abdul Aziz University, 1995).

1.8. Significance of the study

'The Kingdom has a great need for well-educated Saudi nurses who understand the scientific principles of nursing, advances in nursing science, and cultural origins of problems. The operation of hospitals and continued development of nursing is unthinkable without foreign nurses for the foreseeable future, but they will be led and ultimately replaced by Saudi nationals' (Tumulty, 2001, p.287).

Although Saudi Arabia experienced a noticeable development in its health care delivery system, there remains a lack of Saudi health care professionals, particularly nurses, with 61% of health care providers being expatriates (WHO, 2006; Carty et al., 1998). This resulted in a disaster during the Gulf war in 1991 as most health and other professionals returned to their own countries. Since then, the government has decided that 'Saudization' of health care sectors is necessary (Tumulty, 2001). Table 1.1 shows the Ministry of Health development plan to increase the native Saudi health workforce between 2005 and 2020.

Table 1.1: Saudi Health workforce development plan (Source: WHO, 2006)

Category	8th plan (2005-2010)		9th plan (2010-2015)		10th plan (2015-2020)	
	Total	% Saudi	Total	% Saudi	Total	% Saudi
Physicians	38, 104	23	42, 300	28	46, 846	33
Dentists	4, 572	53	5, 076	61	5, 739	67
Pharmacists	10, 830	33	12, 269	42	13, 315	49
Nurses	76, 573	31	86, 756	38	96, 131	44
Health technicians	51, 049	62	57, 837	72	64, 087	81
Total	181, 128	39	204, 238	47	226, 118	53

Saudi Arabia has been growing economically, technologically, and even educationally. This development has affected different sectors including health care settings (Al-Osimy, 1994). The health care system has high standards (Carty et al., 1998). However, many challenges exist. With the Saudi population growing at 2.3% every year the number of dependant individuals is increasing. Moreover, the country is experiencing vast changes in the kind of illnesses patients are experiencing. Diseases have changed from 'communicable' diseases to 'expensive non-communicable' diseases or 'diseases of affluence' such as renal failure, cancer, cardiovascular diseases, and road traffic accidents (WHO, 2006, p.27).

In response to the requirements of the country, the Saudi education experienced noticeable changes. Basic nursing education experienced changes either in private or governmental sectors. Many different nursing educational programmes have been established. The main aim of these programmes is to produce competent and well-trained graduate nurses who can meet the needs of the patients and the highly advanced hospitals (Tumulty, 2001). The

Ministry of Health alone is in charge of 43 different colleges and health institutes teaching different health care specialties (WHO, 2006).

Saudi Arabia has applied Western standards to its hospitals and employed Western curricula in its Universities. However, reviewing curricula indicated that they might not fully meet the standards applied to the hospitals (Simpson, 2002; Tumulty, 2001). Simpson (2002) stated that Saudi nursing training programmes lack training that would help nurses to cope with serious complex illness and hospitals of Western standards. This means that, although a lot of effort has been applied to improve services and the education system, more work is still required.

The main difficulty is that there is 'no organisation or mechanism for overseeing of the curriculum of nursing schools' (Tumulty, 2001, p.289). In Saudi Arabia, nursing programmes have no standardised curriculum (Simpson, 2002). There is no literature discussing the nature of undergraduate nursing education in Saudi Arabia. However, some papers reflect on the medical education and this might reflect the nature of Saudi nursing education since both programmes are under the umbrella of the School of Medicine and Allied Health Sciences. Al- Hazimi et al. (2004) described Saudi medical education as being traditional and based on collecting information. Students are totally dependent on teachers' information and they are not encouraged to use other resources. Moreover, they consider lectures and clinical practice as the expected way of education. Students view the learning process as the teachers' responsibility and it is limited to materials which should be memorised to repeat in examinations. Al-Gindan et al. (2000) considered Saudi medical curriculums to be crowded and based on repeated lectures and examinations. In addition, they described medical

education as lacking distinction between basic theoretical subjects and practice, with improper use of available resources.

The situation is the same within nursing schools. From the researcher's experience as a student and a teacher, the teaching system is considered to be traditional; relying on lectures and regular examinations. There is no evidence that students are actively participating in their learning. Students are not encouraged to seek other sources of learning. In addition, the teaching style facilitates passive learning rather than active learning. As a student it might be difficult to cope with the educational materials, which are extensive and totally different from those used when studying in school. Many terminologies and new concepts have to be learned. The traditional education system affects students even when they graduate; they find themselves in shock when they start working, mainly because they cannot link what they have learned in college to practice. They take a long time to adapt to the clinical area. Furthermore, there is a lack of collaboration between hospital nurses and university teachers, which negatively affects nursing students' clinical skills. This has been also acknowledged by Tumulty (2001) who considered Saudi nurses' training as being 'spotty'.

After identifying the general problem, it is worth reiterating that Saudi nurses need to be knowledgeable, skilful, and critical thinkers to meet the high standards applied within the hospitals. Nurses need to be able to cope with the growing Saudi population, and the presence of complex and serious health problems. Therefore, the kingdom needs to evaluate current teaching methods, and modify them to one which will foster critical thinking and problem solving abilities; as well as contribute to providing professional nurses who are knowledgeable, autonomous, and confident. Education must concentrate on patients' safety and high quality of care:

'Saudi nurses would be better prepared to practice with sound clinical judgments grounded on scientific evidence, improve their practice and to be able to defend nursing actions' (Simpson, 2002, p.4).

The next section will discuss the conceptual framework for this study and how it informs the research process and its findings.

1.9. Conceptual framework: Theory of Adult Learning (Andragogy)

Malcolm Knowles is considered to be the father of adult learning theory. He recognised the importance of adult learning and provided a very useful strategy that is thought to be helping education professionals to establish ways that will help adults learn effectively (Knowles et al., 2005). This theory is based on the importance of a learner being independent, self-directed, and having control over his/her learning process (Mitchell & Courtney, 2005). This theory was selected to provide the theoretical support for this research.

In his book, Knowles highlighted the origin of adult learning in education. He argued that, although adult learning was not considered for years, it was not a recent concept as it had been recognised for generations and crosses a number of cultural and geographical spaces. According to him, the Ancient Romans were concerned with educating adults instead of children. In their time, teachers considered adult learning to be 'a process of mental inquiry' (p.35). Learning is an active process and learners are guided to question. In the past, the old Chinese had established what is known as the 'case method'. With this, learners are divided into groups and each group has a leader. The leader or a member will introduce a problem or a difficulty, then the group members will be encouraged to investigate and analyse the problem and find relevant solutions for it. The 'Socratic dialogue' was introduced by the

Ancient Greeks, with questions being introduced to group members who are encouraged to use their thoughts and experiences to answer these questions. After World War I, the American association of adult learning conducted a study and, based on its result, they established special characteristics for the adult learner. Based on that study, the concept of adult learning was divided into two parts. The first was called the 'scientific stream' in which adults learn through experimentation and investigation; the second stream was referred to as 'the artistic stream' where individuals learn through experience.

Knowles established what was referred to as the Andragogical model in which he identified six characteristics that should be available in an individual for him to be considered as an adult learner. These characteristics are:

1.9.1. The need to know

Before starting to learn anything, adults are required to recognise their need to learn. Knowles referred to educators as 'facilitators' instead of 'teachers' and argued that it is the duty of facilitators to guide learners to discover their 'need to know'. He suggested a way that might help learners to identify that is by evaluating the differences between their current situation and the desired future one; how they see themselves now and what want to achieve later (Knowles et al., 2005).

1.9.2. The learners' self-concept

With this the adult learner is obliged of his own decisions. As a result he/she will become concerned with others seeing him/her as an independent person. The adult learners will become aware that it is difficult to return to what they used to be in school previously. They are now independent; they are not expected to sit on their chairs and wait for facilitators to

provide them with information. However, this is not easy; learners might experience difficulties and may require help to move from the 'passive learning' level they used to adopt in school to the 'self-directed learning' level.

1.9.3. The role of learner's experiences

Knowles considered adult learning to be an 'experiential technique', in which adults bring experience gained since childhood to the learning environment. He argued that life experience varies from one individual to another. Individuals have different learning styles, backgrounds, aims and objectives, and concerns. Therefore, the concept of adult education is about making the learning process more individualised. Recognising that individuals' experience is the biggest source of learning, experiential learning can be facilitated through group work, simulations, case studies, and experiments; instead of the traditional way of learning where information will be transmitted from the teacher to students. It is important to bear in mind that experiences might result in a negative effect. Individuals might tend to be biased by their experiences. This could prevent individuals from accepting new information or others' opinions. Therefore, adult learning strategies require the introduction of new ways that help adult learners to examine their values and beliefs and the way they see things, as well as becoming more open- minded.

1.9.4. Readiness to learn

Adults learn things that will help them to deal with life conditions. Moreover, establishing developing tasks that allow the learner to move from one level to another will increase individuals' readiness to learn. This can be established through simulation and other strategies that allow students to be in a position of dealing with different situations.

1.9.5. Orientation to learning

This can be referred to as motivation to learn. For adults the eagerness to learn will increase when they know to which level that learning will enable them to deal with life problems and perform their tasks. This means more knowledge retention and skill will be established when what is learned is applied to real life.

1.9.6. Motivation

External factors are an important source of increasing adults' interest in learning, such as a new position and better salary. The strongest motivators are the internal ones, such as seeking a better quality of life and better social condition. Motivation might be reduced by factors such as lack of ability to learn and lack of facilitation for the process of adult learning.

Based on the above-mentioned framework, Knowles described the adult learners as follows:

'adults need to know why they need to learn something; adults maintain the concept of responsibility for their own decisions, their own lives; adults enter the educational activity with greater value of experiences than do children; adults have a readiness to learn those things that they need to know in order to cope with real-life situations; adults are life-centered in their orientation to learning; and adults are more responsive to internal motivators than external motivators ... The andragogical model is not an ideology; it is a system of alternative sets of assumptions, a transactional model that speaks to those characteristics of the learning situation' (Knowles et al., 2005, p.72).

Kenner and Weinerman (2011) added very important elements which should be considered while educating adults. They claimed that adults collaborate with their teachers, they hold different skills that young learners do not have, such as maturity, and they have a different view of the world.

In summary, it might be argued that Malcolm Knowles' adult learning theory came from adult learning concepts generated centuries ago, in addition to the work of organisations concerned with aiding their workers to perform better in the work environment. The school education which uses what might be referred to as the 'pedagogy model' might not help prepare for the outside environment and its challenges. The adult learning theory tends to meet the adult learners' requirements and distinguish them from traditional learners (Kenner & Weinerman, 2011).

This theory was chosen as a framework for this study for a number of reasons. Initially, PBL was established based on principles of the adult learning theory (Distler, 2007). According to Farmer (2004), success in developing PBL programmes can be achieved if they are derived from adult learning theory. In addition, this theory explains what PBL appears to be achieving as discussed in the literature (Yuan et al., 2009; Lee et al., 2004; Cooke & Moyle, 2002; Morales-Mann & Kaitell, 2001; White et al., 1999; Stern, 1997). Knowles's characteristics of the adult learner are consistent with the concept of PBL, in terms of its aims and expected outcomes. Both stress the importance of helping students to become independent and self-directed while learning, being eager to learn, using their previous knowledge and experiences, and applying what they have learned to real life situations. In addition, strategies that Knowles has suggested to encourage adults to learn were similar to

the elements of PBL discussed in the literature such as case methods, groups' discussion, questioning and using experience and thinking to answer questions raised.

PBL will facilitate the principles of Knowles's adult learning theory through the following process: using case methods or case scenarios stimulate students' need to learn through searching for answers to questions raised. Moreover, students will use their experience and existing knowledge to identify concepts and reasons for problem. This will contribute to self-directed learning when students try to find out any further learning requirements. Students' learning needs will be met thorough studying independently. They will have overall control over the source of required information either in books, the internet or asking experts. This explanation of the PBL process was based on the following authors' work (Distler, 2007; Biley & Smith, 1999; Margeston, 1998).

University students might be seen as adult learners who should not merely sit in their chairs and wait for teachers to give them information. In a few years they should be ready to integrate into the working environment and take responsibility for tasks. This applies to nurses, where the development within health care environments puts stress on the importance of graduating nurses being critical thinkers, independent, and able to deal with unexpected health problems (Yuan et al., 2008a; Shin et al., 2006b). Those outcomes match the principle of the adult learning theory and what PBL contributes to it. With the understanding of adult learners through Knowles's approach, PBL can be facilitated. Figure 1.1 will summarise what has been discussed above.

Knowles's theory

- Self-directed while learning
- Need to learn
- Readiness to learn
- Knowing what and how to learn

- Using previous experience

- Life-centred while learning

- Examining own habits and willing to accept new things

PBL process

- Introducing scenarios
- Group work and discussion
- Increasing students' motivation to spend time looking for required information
- Deciding on the resources of required knowledge

- Group work and discussion
- Recalling previous knowledge and experience
- Analysing and critiquing problems
- Solving problems

- Group work and discussion
- Reflecting on the problems from students' clinical experience
- Reflecting on the problems from real life experience

- Group work and discussion
- Listening to different proposed solutions by the group members
- Reflection

Outcomes

- Participating in the learning process
- Communication skills
- Better academic performance
- Thinking and analysing
- Bridging the gap between theory and practice

Figure 1.1: Facilitating the principles of Knowles's adult learning theory through the PBL process

1.10. Conclusion

This chapter explored the context of this study. It discussed developments within Saudi Arabia and the effect of these changes on the education system and health care setting. The significance of the study has been addressed, and the conceptual framework for this study has been described. Knowles's adult learning theory is used as a conceptual framework. This theory will guide the implementation of the PBL elements in this study. In addition, it is expected to explain this study's finding, and identify whether incorporating the PBL elements in a traditional course facilitates the principles of this theory.

Chapter 2: Literature review

2.1. Introduction

This chapter has five aims. First, to discuss the issues around students' approaches to learning. Second, to define the term 'critical thinking', as illustrated by experts in general education and nursing education. Third, to discuss the different methods of teaching critical thinking in nursing. Fourth, to discuss and evaluate critical thinking measurement tools mentioned in the literature. The fifth aim is to discuss the literature addressing PBL and its effect on undergraduate nursing students' critical thinking abilities and educational performance.

The structure of this chapter will be as follows. The first section will discuss students' learning approaches, namely deep learning and surface learning. It will explain how these learning approaches, learning context, and students' learning outcomes are related to each other. In addition, it will discuss how the development of the learning approaches is influenced by different factors; focusing on the effect of the learning environment, and the effect of other factors such as age, experience, personal characteristics, examinations style, and student motivation to learn.

The second section will analyse the concept of critical thinking, including the wide range of definitions of this concept. This will help identify the key elements of this skill. Then, teaching strategies that are thought to enhance critical thinking will be described. Finally, the various measurement tools mentioned within the literature will be discussed and evaluated, to propose the most applicable tool to use in this study.

The third section will be about PBL. Initially, the history of the development of PBL will be explained. Then, literature discussing the PBL concept and its effectiveness will be examined, starting with an explanation of different definitions of PBL. This will be followed by highlighting various studies examining the general effectiveness of PBL as perceived by nursing students, teachers and clinical instructors. This will be followed by a section discussing studies examining the effect of PBL on nursing students' thinking and performance.

2.2. Students' approaches to learning and their relationship with the learning environment and students' learning outcomes

There is strong agreement in the literature that students' learning in higher education can be described in terms of two contradictory learning approaches, which are deep learning and surface learning (Marton & Saljo, 1984; Entwistle & Ramsden, 1983; Biggs, 1979). Each approach is associated with a specific strategy to learn. The surface leaning approach reflects the way of learning where students rote learn taught material, memorise it and reproduce it. However, deep learning reflects the learning approach where students search for meaning and interpret information in order to understand. These two approaches are claimed to reflect the quality of the learning outcome: surface learning is considered to be associated with 'low quality' learning, whilst deep learning is associated with a 'high quality' learning outcome (Leung et al., 2008; Scouller, 1998; Trigwell & Prosser, 1997; Trigwell & Prosser, 1991). Another learning approach sometimes adopted by students is the strategic learning approach. With this approach students apply strategies that allow them to pass their course. It is considered to be formed from deep learning and surface learning approaches together. Students' motivation is competition, whereby they focus on obtaining higher grades to

remain the top students in their classes. Students who adopt this strategy are directed by goals (Price et al., 2009).

The association between deep learning and surface learning approaches, and their learning environment and learning outcome, has been highlighted in many studies adopting both qualitative and quantitative approaches (Trigwell & Prosser, 1997). The literature suggests that students favouring one learning approach over the other might be associated with contextual factors (Scouller, 1998). Entwistle and Ramsden (1983) argued that students' perception of the learning context, taught materials, and content affects the approach they adopt while learning. They were the first to establish relationships between the academic context and students' approaches to learning (Lizzio et al., 2002). Their study was conducted on a large sample of students within various higher education institutions in the UK, and it was conducted on an individual and whole class level. The researchers adopted qualitative and quantitative methods, in which semi-structured interviews were conducted, in addition to using quantitative instruments. The quantitative instruments constructed by them consisted of two different kinds: a questionnaire named 'Course Perceptions Questionnaire' (CPQ), which monitors students' perceptions of their learning environment, and an instrument named 'Approaches to Study Inventory' (ASI), which monitors students' learning approaches. The relationship between students' perception of the academic context and their learning approaches was investigated through conducting a factor analysis of the ASI and CPQ. The result showed that, at an individual level, 'reproducing orientation', which reflects a surface learning approach, was strongly related to the perception of a 'heavy workload'. Similarly, at a classroom and departmental level, 'reproducing orientation' was associated with the perception of a 'heavy workload' and 'less freedom'; whilst 'meaning orientation', which reflects deep learning, was related to the perception of 'more freedom' and 'good teaching'.

Moreover, in their study, they concluded that students' learning approach is related to their perceptions of their learning. Deep learning is related to positive perceptions of their learning experience, whereas surface learning is associated with negative perceptions of assessment procedures and limited freedom in learning.

Although Entwistle and Ramsden's (1983) finding is important, their results were questioned (Lizzio et al., 2002; Trigwell & Prosser, 1991). Entwistle and Ramsden's (1983) study was replicated by Meyer and Parsons (1989) to test its generalisability, conducting the study among South African students. The result showed that, at an individual level, Entwistle and Ramsden's (1983) instruments failed to show relationships between the learning environment and approaches to learning. Meyer and Parsons (1989) argued that a number of the ASI aspects, such as syllabus boundedness, strategic approach, and extrinsic motivation, are based on contextual or cultural factors. Moreover, regarding the CPQ, they experienced difficulties in using it. They considered this scale to be restricted and not a sufficiently broad model for assessing the learning context. In addition, they considered this scale not to allow for adequate examination of the association between the approaches to learning and environmental influences.

Entwistle (1989) responded to the Meyer and Parsons (1989) findings. He argued that there might be problems with the CPQ instrument on the measurement level. He said that, at the time of the original study, the CPQ was built on concepts that had emerged from the results of interviews, and were based on few previous studies. Moreover, the fundamental concepts within the CPQ instrument were not fully tested. On the other hand, he said that there is evidence that aspects concerning the learning context could be explained according to students' views. But there might still be some specific areas within the context that individual

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items must be able to detect. Therefore, he supported the need of developing more alternative items which are capable of investigating the relationship between the learning context and students' approaches to learning at an individual level.

In 1990, Entwistle and Tait used a new version of the ASI. This redesigned scale showed association between 'heavy workload' and 'reproducing orientation', which supports the earlier findings of Entwistle and Ramsden (1983). In addition, Trigwell and Prosser (1991) investigated the relationship between students' perceptions of their learning context, and their studying approaches and learning outcomes. They found that the ways in which students perceive their academic context are related to their approaches to study and learning outcomes. A similar finding was reported by Lizzio et al. (2002). These two study findings are congruent with the Entwistle and Ramsden (1983), and Entwistle and Tait (1990) findings.

Taking into account previously mentioned studies (Lizzio et al., 2002; Trigwell and Prosser, 1991; Entwistle & Tait, 1990; Entwistle & Ramsden, 1983), it might be argued that there is evidence for a relationship between students' perceptions of their academic environment, and learning approaches, as well as academic achievements. This might raise an important question, which is how the quality of teaching and the teachers' teaching style influences students' perceptions of the learning context, their learning approach, and learning outcomes. Since the nature of the teaching and the teaching context (good teaching and freedom), as perceived by Entwistle and Ramsden's (1983) study participants, was found to correlate with the deep learning approach, it could be speculated that good teaching involves reflection on how teachers teach, which can be referred to as the teacher teaching style.

Prosser et al. (1994) argued that knowing teachers' perceptions of the teaching process is important. This will allow understanding of how the teaching process could affect students' ways of learning. Moreover, they argued that correlating approaches to teaching with students' learning strategies might lead to teachers changing their own idea of the process. As a result, students' learning could be positively affected. They conducted a qualitative study to investigate how the educators view their own way of teaching. Based on their study findings, they described five different approaches for teaching.

- **Approach A: Teaching as transmitting concepts of the syllabus**

The main focus of the teacher is transferring knowledge as mentioned in the book or course syllabus, rather than focusing on how the elements of knowledge are linked to each or to students' previous knowledge.

- **Approach B: Teaching as transmitting the teachers' knowledge**

The teacher provides attention to his/her way of structuring information, which means that knowledge will be transferred to students as it was understood or conceptualised by their teacher.

- **Approach C: Teaching as helping students acquire concepts of the syllabus**

The teacher's intention is to help students learn in detail the information mentioned in the book or course syllabus through the interaction with students. Students will not rely on their teacher transmitting information; they will understand the concepts mentioned in the syllabus or text books on their own.

- **Approach D: Teaching as helping students acquire teacher knowledge**

The teacher relies on his/her own understanding, similar to approach B. However, as with approach C and different from approach B, she/he will help students to understand concepts and link them to each other. Students' previous knowledge is crucial.

- **Approach E: Teaching as helping students to develop conceptions**

The teacher considers students' understanding, instead of relying on text books or their own way of understanding. The teacher's role is to help students establish their own way of understanding concepts or ideas about the world.

- **Approach F: Teaching as helping students to change concepts**

The teacher considers students' understanding, instead of relying on text books or his/her own way of understanding knowledge. However, it is different from approach E, because the teacher's intention is to aid students to change their own understandings of concepts or ideas about the world.

Trigwell et al. (1999) compared approaches A and E, conceptualised by Prosser et al. (1994). They said that approach E is a student-centred approach where the main attention is given to how students act and learn, rather than focusing on the teacher's actions. The teacher will help students to learn independently and the teaching environment is less formal. The teacher will observe how students develop concepts and change their own ideas through the interaction and discussion of issues. In addition, students will have an active role. The teacher will not only grade students and provide judgements on performances; s/he will encourage students to ask, and teacher-students interaction will be developed.

However, with approach A, the teacher's role is transferring knowledge and the teaching process is teacher-centred. Students have a passive role and the teacher's concentration is on his/her own knowledge. S/he sees students as lacking knowledge, and his/her focus is on providing as much information as possible, to make sure that students have a full record of what they have been taught.

In their paper, Trigwell et al. (1999) investigated the relationship between teaching approaches and students' learning approaches. Their study found that students who adopt a surface learning approach are those who were in classes where the teachers demonstrate a teacher-centred teaching style, focusing on knowledge transfer. In addition, students in these classes have no role, and no attention is paid to their relationship with their teachers or other previous knowledge. However, students who adopt a deep learning approach are those who are in classes where the teachers demonstrate a teaching style which is student-centred, in which attention is given to students; they are helped to learn independently, the teaching environment is less formal, and the interaction and discussion between students is enhanced. Newble and Entwistle (1986) mentioned another factor within the teaching style that could influence students' learning approaches, which is the level of the teacher's interest and their commitment.

Previously it was speculated that Entwistle and Ramsden (1983) found that students' perceptions of 'good teaching' and 'more freedom' correlated with the deep learning approach. Similarly, Trigwell et al. (1999) found the student-centred teaching approach also correlated with deep learning. They described the student-centred teaching approach as a style associated with 'informal teaching time' where students learn independently. Informal teaching time might reflect 'more freedom', which was mentioned in the study of Entwistle

and Ramsden (1983). This suggests that Trigwell et al. (1999) provide more support to Entwistle and Ramsden's (1983) study findings. Moreover, relating to the previous discussion about how deep learning and surface learning are linked to the students' learning outcomes, it might be argued that Trigwell et al.'s (1999) study results suggest that there is an association between teachers' approaches to teaching and learning outcomes, since the teaching style is shaping the students' learning approaches. This suggests that adopting a teaching approach which is active and student-centred will enable students to develop a deep learning approach, and consequently demonstrate high quality learning.

Through searching the literature on nursing education, it was found that similar findings were reported about how students' learning approaches are associated with the quality of learning outcomes. Specifically, deep learning approaches were positively correlated with academic performances such as GPAs and examination performance, and surface learning was associated with heavy workload and negatively correlated with academic performance (Leung et al., 2008; Snelgrove, 2004; Snelgrove & Slater, 2003).

On reflecting on their findings, Snelgrove and Slater (2003) concluded that nurse educators should adopt a student-centred approach, which will allow for developing deep learning. They considered problem based learning (PBL) as a teaching strategy that facilitates active participation of students who consequently develop deep learning. Studies investigating students' learning approaches in a problem based learning curriculum supported the suggestion that PBL facilitates deep learning (Tiwari et al., 2006b; Newble & Clarke, 1986; Coles, 1985).

Cust (1996) said that, regardless of how the curriculum is designed or its contents constructed, deep learning can be facilitated if the contents of the curriculum are considered by students to be relevant. She speculated that using materials such as videos, examples, and case studies helped students become familiar with the information. Consequently this will lead to students perceiving relevance. In a study conducted by Leung et al. (2008), nursing students suggested that using strategies where case studies, role-plays, and questions are based on scenarios are utilised would increase their interest in learning and consequently this will enhance their understanding of the information. As per their perceptions, these strategies will help students to apply the knowledge gained. It might be speculated that students' suggestions of using case studies, role-play, and scenario-based questions, reflect the need for an active approach to enhance their learning. Wittmann-Price and Godshall (2009) utilised an active approach to enhance nursing students' deep learning. They used recognisable objects and models. Their aim was to help students to develop deep learning through connecting experienced activities and recognisable objects to current information, to enhance memorisation. These techniques were included within clinical teaching classes. After that, they compared students' examination grades with those of a previous class. They found that students who were exposed to the deep learning teaching style, where active learning is used, increased their grades. Moreover, students demonstrated a positive perception of their experiences.

Students' learning approaches could be affected by factors other than their perceptions of the teaching environment. Harper and Kember (1986) found that students' age strongly influences their approaches to learning. They found that older students adopt a deep learning approach, whereas younger students adopt a surface learning approach. They related that to older and younger students having different motivations. Older students might study because they are interested and they learn for enjoyment. In addition, they said that older students' life

and work experiences allow them to become more mature, which consequently affects their approaches to learning. During learning, older students tend to look for relationships, meanings and evidence; this is as a result of their prior work and social experiences. However, young students demonstrate a surface learning approach because their experience is limited to school. They suggested that this learning approach might be influenced by the teaching and examination styles used in schools. Younger students will transfer the learning style they used in school to the higher education setting.

Examination styles can take many forms. They can be multiple-choice questions, short answer examinations, essays, online tests, portfolios, presentations, simulations and clinical exercises (Leung et al., 2008). Multiple choice examinations are a commonly used assessment method in nursing education. They examine a wide range of information within a short period of time (Leung et al., 2008). Moreover, they are commonly favoured by students over essays, because they are perceived as easier and do not increase students' level of anxiety, and contribute to better grades (Struyven et al., 2005). Multiple choice examinations are found to be associated with the adoption of surface learning approaches, whereas essays are associated with deep learning approaches (Scouller, 1998; Thomas & Bain, 1982; Watkins, 1982).

The association between the multiple-choice examination style and surface learning approaches could be as a result of this style being an assessment method that limits students' concentration to certain topics, which are considered as important by their teachers, and expected to be included in the examination. Consequently, this will impact on students' approaches to learning (i.e. what will be studied, and how it will be studied) (Scouller & Prosser, 1994). Newble and Entwistle (1986) argued that in medical schools the assessment

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procedures focus on students' abilities of recalling information. According to them, the structure of the examinations will force students to rote learn material to reproduce it in the examination papers. They said that this kind of assessment method will force students to adopt surface learning approaches, even if the students favour deep approaches. This could be the same situation in nursing schools since they also focus on using multiple-choice assessment procedures which require students' abilities to remember what has been taught and expect to be asked in the examination.

Although studies indicated that multiple-choice examinations (MCQs) led to surface learning, this might not happen if the MCQ style is well structured and includes scenarios that contribute to critical thinking (Leung et al., 2008). Scouller and Prosser (1994) found students using a deep learning approach are those who perceived the MCQ to be evaluating their higher level cognitive abilities such as applying and analysing. On the other hand, surface learning approaches were associated with perceptions of MCQs as only evaluating knowledge.

Newble and Clarke (1986) argued that students' motivation is another reason for differences in their learning approaches. According to them, students whose motivation is derived from focusing on passing the course are more likely to develop surface learning as their concentration is focused on passing the course assessment through reproducing what has been taught, without paying attention to understanding the materials. However, students who demonstrate a deep learning approach are those who are interested in the course materials, and their focus is on understanding them. This also provides further support to what was mentioned previously about differences in learning approaches between younger and older students. These two different kinds of motivation were described by Cust (1996) as intrinsic

motivation and extrinsic motivation. Extrinsic motivation reflects reproducing knowledge to get through the examination or assessment requirements, whereas intrinsic motivation reflects personal interest in learning and concentration on understanding.

Personality traits have been found to shape learning approaches. Zhang (2003) conducted a study to investigate the relationship between personality traits and approaches to learning. He examined the relationship between five different dimensions of the personality traits, and learning approaches. These five dimensions were neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Neuroticism reflects negative personal characteristics such as anxiety and depression. Openness to experience reflects the ability to take part in intellectual activities, and preferring new ideas and experiences. Conscientiousness reflects efficiency, determination, responsibility and persistence. Extraversion reflects being assertive, highly active, and social. Finally, agreeableness reflects being friendly, considerate, and self-effacing (Chamorro-Premuzic & Furnham, 2004, p. 250).

In his study, Zhang (2003) found that both openness to experience and conscientiousness lead to a deep learning approach. On the other hand, neuroticism is related to a surface learning approach. A similar finding was reported by Chamorro-Premuzic and Furnham (2008). They also reported an important result, which was that openness to experience, and conscientiousness, and deep learning are all positively related to academic performance. This further supported learning approaches and learning outcome being associated with each other.

Zhang (2003) argued that teachers should consider training students to become more 'open minded and conscientious' while learning, since this can contribute to developing a deep learning style. This might support the need for a student-centred approach to teaching style. A

student-centred approach could contribute to openness to experience and acceptance of new ideas through interaction and discussion between students. In addition, it could lead to conscientiousness through facilitating self-directed learning and independent learning.

In summary, the above discussion suggests that students' approaches to learning are influenced by various factors. The perceptions of the learning environment, assessment methods, age, experiences, personal characteristics, and students' motivation shape the approach students use to learn. The literature reviewed here has many implications for nursing education. It appears that students' perceptions of their learning environment, teaching styles, and assessment methods are likely to influence students' learning; they could either hinder or facilitate it. Traditional teaching methods, which are teacher-centred, associated with heavy workload, rely heavily on knowledge transmission and use objective assessment methods which only assess students' abilities to recall information, might not facilitate deep learning. As a result, with the rapidly changing health setting, facilitating self-directed and deep learning is important, as it may help nursing students to access necessary information when it is required (Tiwari et al., 2006b). This can be achieved through adopting active learning strategies such as PBL, which have been reported as having success in facilitating deep learning.

2.3. Critical thinking

To achieve the second aim of this section, a range of research literature databases were searched including MEDLINE, CINAHL, British Index of Education, and ProQuest education database, and more general searches were conducted of other sources such as university libraries and internet-based materials via Google, and Google Scholar. The search terms used were 'critical thinking', 'critical thinking in nursing', 'critical thinking' AND

'nursing', 'nursing students critical thinking'. Most of the references used were obtained via the MEDLINE and CINAHL databases. Different papers discussing the concept of critical thinking and the way of teaching this skill were found. The process selecting relevant papers for conducting a literature review on critical thinking are presented in Figure 2.1.

2.3.1. Defining the term 'critical thinking'

The concept of critical thinking has been defined in many ways. Facione and Facione (2010) defined critical thinking as 'purposeful, reflective judgement focused on deciding what to believe or what to do' (p.3). They considered critical thinking to be an essential part of human progress as, on a daily basis, every person faces situations and events that result in interpretation, analysis, evaluation, and drawing inference. In 1990, Facione published the 'Delphi report'. This report described certain characteristics of the ideal thinker as:

> 'habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgements, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit' (Facione, 1990, p.2).
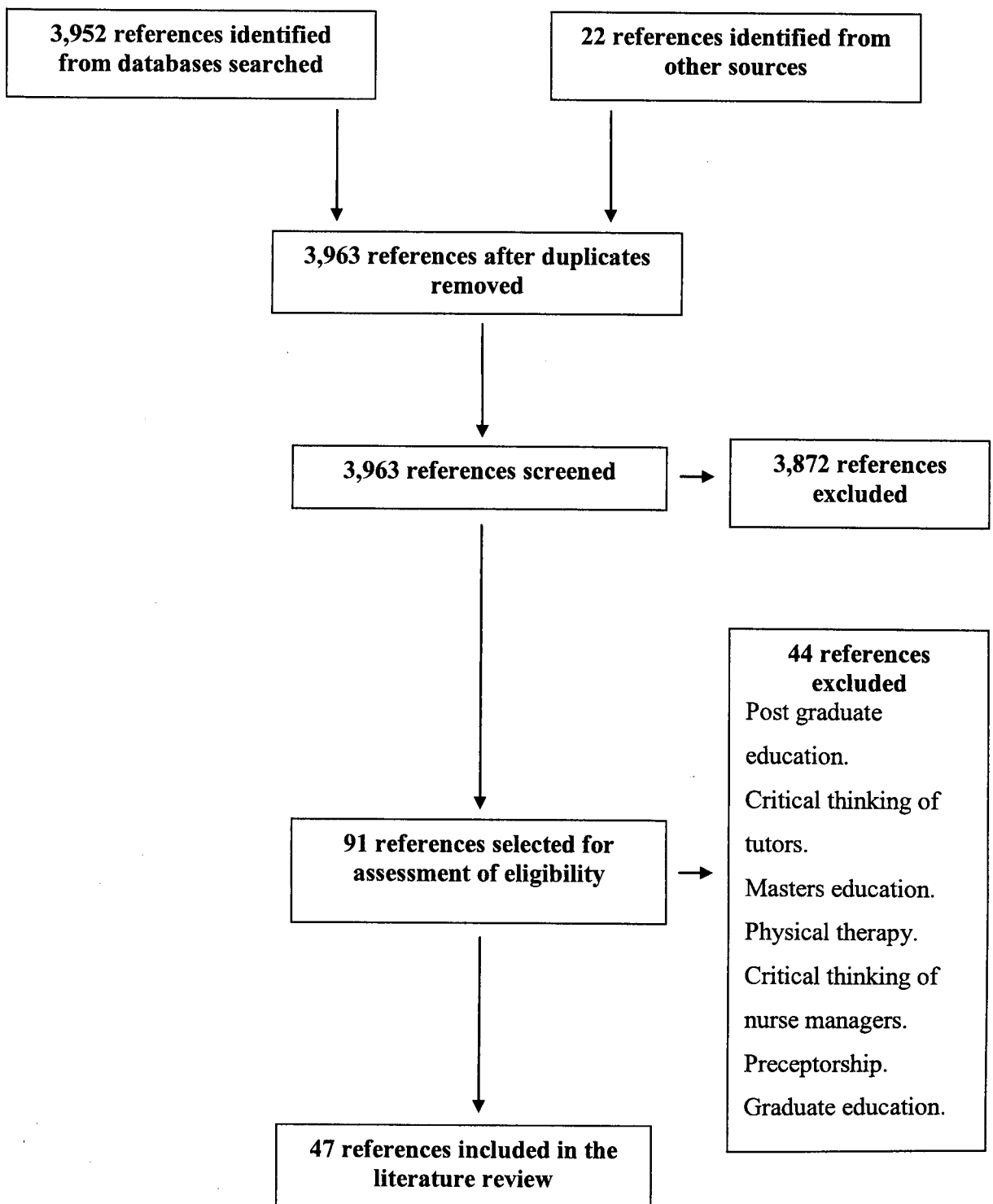
Figure 2.1: The structure of the selection process of relevant papers for conducting a literature review on critical thinking

Winch (2004) described critical thinking as 'critical rationality' and referred to that as 'the ability to evaluate arguments and evidence' (p.468). The ability to monitor arguments was found to be one of the essential skills that individuals require in order to demonstrate critical thinking abilities. These abilities are often evaluated by a critical thinking test, such as the one established by Facione and Facione (1990) named the California Critical Thinking Skills Test (CCTST). Other tests such as that produced by Watson and Glaser (1980), called the Watson Glaser Critical Thinking Appraisal (WGCTA) fulfil a similar function. Facione and Facione (1990) referred to monitoring arguments as analysis in which individuals will explain the meaning of information and determine significance. On the other hand, Watson and Glaser (1980) consider monitoring arguments as individuals' abilities to separate strong and related arguments from weak and non-related ones. Bell (1991) considered being involved in debates as an effective strategy that will improve and develop debating skills.

Barak et al. (2007) used the Facione and Facione reports to categorise critical thinking abilities. They divided critical thinking into two parts: firstly, skills and inferences and secondly, disposition. Disposition is referred to as the learner's drive to think critically. When critical thinking is discussed, it is essential to highlight critical thinking skills and individuals' disposition towards that. This trait strongly affects the development of individuals' critical thought; it demonstrates the learners' actual tendency to apply critical thinking to various situations (Barak et al., 2007; Mason, 2007).

Black (2004) used the phrase 'cognitive thinking skills' to describe critical thinking. Later, Barak et al. (2007) categorised cognitive thinking skills into higher order cognitive skills and lower order cognitive skills and distinguished between them. With lower order thinking skills, individuals tend to remember information only; while with higher order thinking skills

individuals tend to think, analyse and evaluate unexpected situations, make decisions and solve problems. Barak et al. (2007) considered higher order thinking to reflect critical thinking. Siegel (1990) claimed that critical thinkers are those who are 'appropriately moved by reasons' (cited in Mason, 2007, p.341). Reasoning is considered to be essential for the two dimensions of critical thinking abilities, which are the skills and disposition dimensions (Mason, 2007).

Buffington (2007) highlighted another aspect of critical thinking, which is understanding one's own and other individuals' thoughts. In addition, Mason (2007) cited Paul (1982) who categorised individuals' thoughts into two levels and referred to them as levels of critical thinking. The first level was critical thinking in the 'weak sense' where the individual thinks critically about the others' position rather than his own. The second level was critical thinking in the 'strong sense' where the individual thinks about his own position, arguments and thoughts, as well as the whole world view (p.341). According to Mason (2007), strong thinkers are able to take into consideration the whole world views and arguments rather than concentrating on the individual ones.

Critical thinking has been defined as 'reflective thinking' (Edwards, 2007; Norris, 1989). According to Banning (2006), there are various definitions of critical thinking. However, issues described in these definitions might not be as essential as the ability to reflect. She considered reflection as the skill that initiates other critical thinking skills. Riddel (2007) cited the definition of reflective thoughts proposed by Dewey (1933), which clearly explained the process of reflection:

'Active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends ... it includes a conscious and voluntary effort to establish belief upon a firm basis of evidence and rationality' (p.122).

Dewey (1933) considered reflective thought to be a process starting with having doubts or being confused about certain matters. Those doubts and confusion usually lead to curiosity to search and know about matters before obtaining conclusions (Riddel, 2007).

Norris (1989) and Mason (2007) highlighted critical thinking in the educational context. According to Norris (1989) critical thinking will be considered as an 'educational ideal' if critical thinking dispositions go beyond 'the tendencies to behave'. Tendencies to behave must be rationalised by 'educational norms' (p.22). Mason (2007) argued that some people considered critical thinking as relying on knowledge and understanding of the subjects that the person works on. Yuan et al. (2008a) referred to what Mason (2007) has argued as 'solid-base knowledge'. Solid knowledge is obtained through teaching students properly in classes; after that, the critical thinking process comes, where the teachers help students to think about the information they obtained from lectures and try to apply it to real life. Critical thinking dispositions are affected by students' standards and culture of education and what they are seeking from education. Some students are encouraged to act in particular ways because their main reason is to make their teachers happy about them and to get high grades. However, critical thinking will develop if the student is interested in the subject. Seeking higher grades and pleasing the teachers will not develop curiosity, nor lead the critical thinker to search for solutions and alternatives.

When looking at all previous definitions and explanations given to the term 'critical thinking', one can say all mentioned that particular skills or abilities are very important to consider a person to be a critical thinker. In addition, not one of all those factors is less important or can be ignored; all have the same value. Therefore, a critical thinker should have a mixture of all previously mentioned factors, because all of them complement each other. The next section will discuss how the term is defined within nursing, specifically concentrating on what critical thinking skills are required for nurses to be counted as critical thinkers.

2.3.2. Critical thinking in nursing

Critical thinking has been seen as an important issue for developing nurses and is considered as an integral part of professional accountability and nursing quality of care (Beers, 2005; Fitzpatrick, 2005; Turner, 2005; Staib, 2003). According to Facione and Facione (2008), in health care professions, practising without proper analysis of the problem and providing care without reflecting on or evaluating its impact is not considered as an appropriate standard of care. Analysis, reflection and evaluation reflect the elements of critical thinking. Further to that they argued that proper clinical judgement requires not only possessing the critical thinking skills but also strong dispositions towards them. Dispositions towards critical thinking allow nurses to provide safe and proficient care (Stewart & Dempsey, 2005). Critical thinking disposition is referred to as holding a constant and continuous internal drive to engage in problems and come up with decisions using thinking (Profetto-McGrath, 2003). Strong dispositions towards critical thinking require individuals to be inquisitive, systematic, truth-seeking, open-minded, analytical and confident while interpreting (Rogal & Young, 2008).

Brunt (2005) specified that certain cognitive skills are required in nursing practice to be counted as necessary to be a critical thinker. Those skills are: analysing, applying standards, discriminating, information seeking, logical reasoning and predicting and transforming knowledge. In addition, another important aspect can be added, which is being able to decide what solution or approach is the best for a certain task.

It has been claimed that critical thinking in nursing is another way of expressing the scientific method, which is considered as 'a systematic approach to identifying a problem, collecting data, finding a solution and drawing evidence-based conclusions' (Staib, 2003, p.499). Staib (2003) considered the scientific method in nursing to reflect the nursing process, which consists of assessment, nursing diagnosis, planning, implementation, and evaluation. This has been supported by Adams (1999) who considered the concept of critical thinking in nursing 'to be formed of logical reasoning of the scientific method or nursing processes'. Moreover, she suggested that an easy way of explaining critical thinking in nursing could be by defining certain activities that form a process. She viewed creating a 'problem statement', which she refers to as a 'nursing diagnosis', before taking any action to be important. It might be said that the activities she suggested are similar to the nursing process mentioned earlier, which is also referred to as a nursing care plan.

Swinny (2010) argued that knowledge and practice together define critical thinking in nursing. In other words, critical thinking in nursing does not necessarily depend on education and knowledge alone. However, skills and experience are important to develop critical thinking. In addition, she added that a nurse who is a critical thinker is capable of providing the best care that improves the patient condition. Similarly, Rubenfeld and Scheffer (2001) consider that the critical thinker needs to be able to translate what is learned into action. On

the other hand, Tanner (2005) argued that describing critical thinking in nursing as an outcome of education might not be relevant. She considered critical thinking in nursing practice as:

'Challenging taken-for-granted assumptions and practices and requiring action, involvement, and risk-taking' (p.47).

According to her, this type of critical thinking highlights the link between health care policy and political and economic interaction. It allows nurses to question and find out what nursing actions are required to meet the needs of particular individuals.

2.3.3. Teaching critical thinking in nursing

Traditionally, learning is usually monitored by the ability of students to recall. Teachers consider that students who can remember most of the contents they learned in the class will be able to apply solutions to the clinical situations or exam questions they are given (Ironside, 2005). Therefore, teachers try to ensure that all required content is covered during the course. Graff (2003) has claimed that students who memorise large amounts of the content usually have high test scores. However, during the exams, looking at how students think is not considered. This means that memorisation is viewed as the primary evidence of learning.

The literature highlighted many different teaching methods and strategies thought to be fostering nursing students' critical thinking. DeSimone (2006) discussed a curriculum design to foster critical thinking for a bachelor's nursing programme. She argued that the teaching staff found writing assignments, oral presentations, debates and discussion, and using case studies improved critical thinking. Caputi and Engelmann (2004) argued that, with case studies, individuals think, evaluate theories within real-life situations, become encouraged to

learn, and recall what has been learned recently or over a long period of time. Moreover, this strategy claimed to improve communication within the students' group and between the students and their teachers. With case studies, students will engage together as a group to provide a rationale for their opinions, propose solutions to problems, listen to others' ideas and then compare, analyse the information collected, and come up with decisions. Students usually learn effectively and better when theoretical material is discussed and applied to the practical environment (Youngblood & Beitz, 2001).

Encouraging students to write a reflective journal in which they will reflect on their clinical experience was found to enhance critical thinking (Kenninson, 2006). Chirema (2007) considered reflective journals as a tool that enables students to write about their feelings and perceptions. In addition, it enhances learning within the clinical setting. Youngblood and Beitz (2001) referred to reflective journals as 'clinical reaction papers'. With this, students will be asked to reflect on nursing practice and roles as they have experienced them within the clinical sitting. Reflection might not be an easy skill to master and full benefit is only gained when students become familiar with how to reflect on their experience (Dickerson, 2005). The best way to facilitate that might be guiding students through this task, by using certain questions that stimulate reflection. Dickerson (2005) mentioned certain questions to help students reflect on their clinical experience, which are:

- What has worked?
- Why did it work?
- What didn't go so well? Why?
- What might have been done differently?
- Were there additional resources that could have been used?

Another teaching strategy that has become popular is simulation (Medley & Horne, 2005). With clinical simulation a real life medical situation will be demonstrated through using a human patient simulator. This is a computerised device which is prepared in a way to show physiological changes such as an increase or decrease in blood pressure or heart rate, with medical conditions such as bleeding. In addition, these human patient simulators are prepared to receive certain treatments such as administering intravenous fluids or other medications. It will also demonstrate the response to these treatments (Ravert, 2008). An advanced technology where simulation can be also used is interactive videodisc systems. With this technology different multimedia technologies will be used such as imaging, using animation, sounds, pictures and the internet (Yeh & Chen, 2005). Kaddoura (2010) and Medley and Horne (2005) mentioned certain advantages of simulation technology, which are:

- Facilitating active learning.

- Allowing students to experience real life situations without the need to practise them on real patients.

- Providing the students with the chance to discuss errors and correct them.

- Facilitating patients' safety and reducing possible medical errors.

- Improving students' clinical skills and decision making skills.

- Improving communication, teamwork, and confidence.

2.3.4. Outcome measures of critical thinking abilities

This section aims to appraise various critical thinking measurement tools used to measure the critical thinking abilities of undergraduate nursing students. The main reason for that is to decide on the most applicable and valid tool for this study. Through reading the literature about critical thinking and PBL, it was found that various critical thinking measurement tools have been used within a range of disciplines of undergraduate education including general

education, medical education, nursing education and pharmacy education. Some were used frequently in nursing whilst others were rarely used or not used at all. Different terms were used to search about critical thinking measurement tools such as: 'problem based learning' AND 'critical thinking', 'critical thinking measurement tools', 'critical thinking measurement', 'measuring critical thinking', and 'validity and reliability of critical thinking measurement'. In addition, a search was made for measurement tools mentioned in the previous literature about critical thinking and PBL including: the CCTDI, CCTST, WGCTA and others. To limit the search for the tools used in nursing, several terms were combined together such as 'measuring critical thinking' AND 'nursing' or 'critical thinking' AND 'nursing' AND 'PBL', or 'critical thinking tools' AND 'validity and reliability'. Figure 2.2 will provide information on the structure of the selection process of information about measurement tools.

The literature search indicated that, although there is consensus in the literature about the definitions of critical thinking, there was no single tool regarded as the most appropriate to evaluate critical thinking. In addition, not all tools are validated for their use because they resulted either in inconsistent or non-significant results. Tools that have been frequently mentioned in the literature are:

- the California Critical Thinking Skills Test (CCTST);

- the California Critical Thinking Disposition Inventory (CCTDI);

- the Watson-Glaser Critical Thinking Appraisal (WGCTA);

- the Cornell Critical Thinking Test (CCTT);

- the Ennis-Weir Critical Thinking Essay Test.

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Figure 2.2: The structure of the selection process of relevant literature about critical thinking measurement tools

2.3.4.1. The California Critical Thinking Skills Test (CCTST)

The CCTST monitors individuals' cognitive abilities. It consists of 34 multiple-choice questions to investigate the main critical thinking skills described in the Delphi report (Rogal &Young, 2008). Each correct answer is given one point: as a result the score of the test will be in the range 0-34, with five subscales investigating the following abilities: analysis, evaluation, inference, deductive reasoning, and inductive reasoning. These five subscales are described as follows:

- Analysis: this measures the ability to explain the meaning of information and determine its significance. Arguments' analysis is also considered as a sub-skill required to be included with analysis.

- Evaluation: this measures the ability to assess and monitor the strength of statements and information, in addition to the ability to evaluate other people's experiences, beliefs, justifications or reasoning.

- Inference: this measures the ability to collect information that is required for reaching a conclusion (i.e. the person can make a hypothesis, using the proper information, and obtain consequences).

- Deductive reasoning: this measures the ability to start with a principle proposing that it is correct and then concluding that the result is also correct based on calculated or derived evidence.

- Inductive reasoning: this measures the ability to start with a principle and reach a conclusion using the required experience and knowledge.

(Phillips et al., 2004)

2.3.4.2. The California Critical Thinking Disposition Inventory (CCTDI)

The CCTDI was designed by Facione and Facione (1992). It monitors the dispositions to think critically described previously in the Delphi report and it examines the attitudinal part of critical thinking (Stone et al., 2001). This test consists of 75 Likert-type statements with seven scales, which are: truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and cognitive maturity, each of which is described below. Those questions have no wrong or true answers; they are only evaluating respondents' beliefs and opinion (Facione & Facione, 2007). Individuals' responses will be assessed in levels of agreement ranging from strongly disagree to strongly agree:

- Truth-seeking: this measures the willingness of an individual to find the truth and ask questions to discover the proper and correct knowledge, even though it may weaken his/her beliefs.

- Open-mindedness: this measures the ability to accept others' views and to monitor one's own for bias.

- Analyticity: this measures an individual's readiness for complicated situations and difficulties and his/her abilities of imagining outcomes and using evidence. All those factors indicate whether an individual is able to determine the facts about the problem and be able to find a better way of solving it.

- Systematicity: this measures the ability to be organised when approaching a problem.

- Self-confidence: this measures the individuals' trust in their own reasoning or judgement abilities.

- Inquisitiveness: this measures the individuals' curiosity and desire to gain more knowledge.

- Cognitive maturity: this measures the individuals' abilities to pause and reflect, think about issues and make judgements. It is mainly concerned with identifying alternative solutions for a problem.

Each scale is monitored by means of several questions and, once the subscale's questions have been answered, they are converted into scores. The company which owns the rights to this test and makes all papers on a commercial basis did not release information about which questions refer to which subscale. For each subscale, scores ranging from 10 to 30 indicate that students have a weakness in specific critical thinking dispositions and each subscale with scores between 40 and 50 means that the students are positively disposed towards aspects of critical thinking; meanwhile, scores between 30 and 40 indicate that students have an ambivalence in their dispositions and they can be seen as low dispositions (Facione & Facione, 2007). According to the total score of the index, students who obtain below 280 have a serious deficiency in critical thinking, while scores higher than 350 indicate that students have strength in critical thinking.

2.3.4.3. Watson-Glaser Critical Thinking Appraisal (WGCTA)

This is another tool that had also been widely used for measuring critical thinking abilities for nursing students and it is also used in different fields such as art, science and psychology. The test was first released in 1942 (Adams, 1999). It consists of two forms, A & B. The test was often not completed by participants as it took such a long time. In 1994, the test was revised and a new version released called WGCTA-FS.

The test measures the following items:

- Inference: this measures subjects' ability to differentiate between true and false statements in data provided.

- Recognition of assumptions: this measures subjects' ability to identify if the assumptions are clearly presented.

- Deduction: this measures subjects' ability to identify whether information provided ends with a conclusion.

- Interpretation: this measures subjects' ability to highlight the evidence given and judge whether it is applicable to the data or not.

- Evaluation of arguments: this measures subjects' ability to recognise strong arguments from weak ones.

(Gadzella et al., 2006)

2.3.4.4. Cornell Critical Thinking Test (CCTT)

The test is in a multiple choice format which consists of two levels, X and Z. It measures different critical thinking abilities, which are:

- Using inductive and deductive processes.

- Clarifying assumptions and meanings.

- Evaluating credibility of information.

- Evaluating the outcome of observation.

Level X is designed for high school students and Level Z is designed for gifted high school students, college student and adults in general (Plath et al., 1999). The first test is composed of 71 items and the latter is composed of 52 items. The estimated time for completing either of them is 50 minutes. According to Adams et al. (1996) the definition of each item was not

given in the test manual, but the test designers claimed that there were strong relationships between the items.

2.3.4.5. Ennis-Weir Critical Thinking Essay Test

This test is different from previous tests as it has no questions for the examinee to answer (Adams et al., 1996). The Ennis-Weir Critical Thinking Essay Test evaluates the ability of assessing arguments provided in an essay. The essay is in the form of a letter about a parking situation in a fictitious city. Individuals who are undertaking the test are asked to reflect on the arguments in the letter and provide reasons for their judgements. The time given for completing the test is 40 minutes. Plath et al. (1999) stated that the test was designed according to Ennis's definition of critical thinking as 'reasonable, reflective thinking that is focused on deciding what to believe and what to do' (p.214). The test aims to evaluate the following abilities:

- Understanding the situation.

- Detecting reasons and assumptions.

- Stating one's own view.

- Providing reasonable reasons.

- Providing alternatives.   (Adams et al.,1996)

2.3.5. Comparison of critical thinking measurement tools

Through searching the literature on critical thinking, it was found that the CCTST, the CCTDI, and the WGCTA are widely-used tests for monitoring critical thinking abilities in nursing. However, there is no evidence that the other mentioned tests have been used (Cornell Critical Thinking Test [CCTT] and Ennis-Weir Critical Thinking Essay Test). It was, however, considered necessary to explain these tests, especially as some of the CCTT

components are similar to those of the CCTST. In addition, abilities that the Ennis-Weir Critical Thinking Essay Test tends to measure are essential components of critical thinking, as stated in the definitions given by Mason (2007), Black (2004), Norris (1989), and others.

Although those instruments are commonly used for measuring critical thinking abilities, it is important to know to what level these tests can measure specific critical thinking skills required by nurses. The CCTST and CCTDI have usually been selected because they are simple to use, not time-consuming and were created by people experienced in critical thinking analysis. Furthermore, it has been claimed that these tests are valid and reliable (Leppa, 1997).

The validity and applicability of the CCTST and the CCTDI for the nursing profession were investigated in a survey conducted by Stone et al. (2001). They examined how well these tests reflect the critical thinking elements that are important for competent nursing practice. The survey was conducted among different US nursing programmes that provide baccalaureate or higher degrees. The targeted study population comprised faculty members who incorporate critical thinking in their teaching. The result indicated that most of the participants agreed that traits and abilities highlighted by the CCTST and the CCTDI are 'essential' or 'absolutely essential' for nursing practice. On the other hand, it is worth mentioning that, although experts in this study view skills highlighted in both tests to be crucial, they considered the components of the CCTST to only mildly reflect the critical thinking skills needed for nursing practice.

Leppa (1997) also administered the CCTST and the CCTDI to bachelor degree nursing students in one of the United States' universities. Participants had a previous associate degree

from a nursing college or had attended a nursing diploma programme. The tests were administered at the beginning of the programme and after 10 months. At the second test, the researchers examined the reliability of the instruments by using Cronbach's alpha coefficient. Cronbach's alpha is a test used to monitor the internal consistency of an instrument. Internal consistency is defined as the degree to which the items that make up the scale 'hang together' (Pallant, 2007, p.95). To consider an instrument as 'reliable', a Cronbach's alpha of 0.7 or more is required.

For Leppa's (1997) study, the statistical result of the Cronbach's alpha was very low and disappointing for the CCTST. It ranged from 0.21 to 0.51, which was not comparable to the Cronbach's alpha scores released by Facione and Facione, which ranged from 0.68 to 0.70. Based on this result, Leppa (1997) considered the CCTST to be 'inconsistent and unstable'. In addition, it was decided not to use this instrument due to students' poor results and the psychological pressure the test applied on students. The CCTST is designed in a form of multiple-choice questions, which is considered to be the main reason for the psychological pressure. As mentioned previously, these multiple choice questions have right and wrong answers. Each wrong answer will be given one point (Phillips et al., 2004). This could make the students perceive completing the questionnaire as an exam, which will put them under stress and consequently obtain poor scores. Besides, it was found that the test does not match the characteristics of the subjects. However, when it comes to the CCTDI, Leppa found that the reliability scores were acceptable and comparable to those shown in the literature. Therefore, this test was considered to be 'moderately reliable and consistent'.

The internal consistency of the CCTDI was performed in 1992 by Facione and Facione. The test was administered to 1,019 freshmen students. The result indicated that Cronbach's alpha

levels varied from 0.60 to 0.78 for the seven subscales and it was 0.90 for the overall score (Facione & Facione, 2007). This result was also comparable with the result of other studies carried out later with slight variations (Stewart & Dempsey, 2005; Bartlett & Cox, 2002; Stone et al., 2001).

Profetto-McGrath (2003) conducted a study among 228 nursing students in western Canada. The years of the programme ranged from year one to year four. The result showed that there were no significant differences between the four groups in the scores of the CCTST and the CCTDI. Profetto-McGrath (2003) suggested that the CCTST was not applicable to baccalaureate students, as they showed lower scores in this test (mean score=17.4) and high scores in the CCTDI (mean score=312). Later, a study conducted by Rogal and Young (2008) supported the non-applicability of the CCTST to university students. Their study aimed to monitor the critical thinking abilities of nursing students enrolled in a 12-month critical care course in a Western Australia university. The result showed that there were no significant differences between the pre- and post-test results. Students did not show any improvements. They also compared their study sample with a normative group and it was found that postgraduate students scored higher than college students. Rogal and Young (2008) and Profetto-McGrath (2003) justified their findings by arguing that undergraduate students' critical thinking skills require a longer time to develop, which might go beyond the university years.

Only one study conducted by McCarthy et al. (1999) showed a significant development in students' critical thinking skills using the CCTST. The study was conducted in a US university and adopted a cross-sectional deign. Participants were junior and senior nursing students and the study used the CCTST and the CCTDI to collect data. The tests were

administered in the middle of 1995 and repeated in the middle of 1996. The result showed that there were significant differences between the groups. Senior students demonstrated significantly higher scores in the CCTST and the CCTDI. However, the authors addressed an important limitation in the study design. They claimed that the significant differences between the groups could be as a result of innate differences between the groups instead of changes during the study period.

The WGCTA is frequently used in nursing and is considered to demonstrate skills required for nursing practice (Khosravani et al., 2005; Hickman, 1993). However, this tool has shown non-significant and mixed results in studies carried out among nursing students. For example, Saucier (1995) conducted a longitudinal study comparing students' critical thinking abilities at admission to a BSN programme and at graduation. He recommended using a different instrument rather than WGCTA to monitor critical thinking skills. Additionally, Vaughan-Wrobel et al. (1997) used the WGCTA to monitor critical thinking skills of Caucasian, female nursing students in the University of Arkansas for Medical Sciences in the US. The test was administered before starting the junior year, after completing it and again after completing the senior year. The result showed no significant differences between the WGCTA scores at the entry of the programme, end of the first year, and graduation. However, between the end of the junior year and the end of the senior year, students' scores reduced; although they were expected to remain the same or improve. A similar longitudinal study was conducted by L'Eplattenier (2001). The study participants were nursing students enrolled in a nursing programme at a US university. The WGCTA was administered four times: before staring the nursing programme, at the beginning of the second semester of the second year, at the beginning of the first semester of the third year, and finally after completing the programme. The result showed that there were no changes in students' critical

thinking abilities as they progress through the programme. Similarly, Daly (2001) used the WGCTA to examine the critical thinking abilities of nursing students enrolled in an 18-month nursing programme. The test was conducted before and after completing the programme. The pre- and post-test scores did not show any significant changes in students' thinking abilities. Insignificant results or lowered scores associated with the WGCTA might not be as a result of defects in the tool itself. However, students' learning experience might have an effect in the way that it was not facilitating the development of their critical thinking abilities. Adams (1999) reviewed 19 published studies using the WGCTA. Studies were done in the period between the mid-1970s and 1992. Only nine of these studies showed significant improvements in students' critical thinking abilities. Six showed no change and four demonstrated mixed findings.

The literature suggested that the WGCTA might not be the most appropriate instrument for testing critical thinking in nursing. This could be as a result of this test being more general and objective and not specifying the dimensions of critical thinking (L'Eplattenier, 2001). Walsh and Seldomridge (2006) found the WGCTA to not be applicable to their nursing programme, which was rationalised by arguing that this instrument monitors 'general reasoning skills' rather than 'discipline-specific thinking skills' that can be learned in nursing programmes. Moreover, the WGCTA was found to highlight logic instead of process; nursing students need to be able to show the ability to follow a process to solve a problem (assessment, nursing diagnosis, intervention and evaluation) (Adams, 1999; Vaughan-Wrobel et al., 1997; Saucier, 1995). For that reason, this is not the best test to monitor nursing students' critical thinking abilities. Norris (1985) said that 'critical thinking is not widespread. Most students do not score well in tests that measure ability to recognise assumptions, evaluate arguments and appraise inferences. Adults, as well, frequently make

judgemental errors on simple problems' (p.44). The WGCTA tends to monitor these abilities. Therefore, it is expected that this test might not reflect the actual critical thinking skills of undergraduate students because individuals vary in their judgements and can make errors. Norris's (1985) view could also be applicable to the CCTST because this test tends to monitor what the WGCTA is monitoring in terms of evaluating arguments and drawing inference. Moreover, Norris's view further rationalised the inconsistent and non-significant results of the CCTST.

In conclusion, it can be argued that the CCTST might be not applicable for baccalaureate students due to its lack of consistency and stability. In addition, it is difficult for baccalaureate students to undertake since it applies a psychological pressure on them through its format of multiple choice questions. It was also found to have non-significant results. The WGCTA is more general and it assesses logic rather than a process. Both the WGCTA and the CCTST monitor critical thinking skills (Walsh & Seldomridge, 2006). It has been found that critical thinking skills require a longer time to develop beyond the university period (Rogal &Young, 2008; Profetto-McGrath, 2003). It can be argued that these tests might be applicable for long-term longitudinal studies rather than short ones. Besides, they monitor the ability to evaluate arguments. Individuals might vary in their way of evaluating things and they might also make mistakes or fail in their judgements. Consequently, it is expected that students will score low in this kind of test or inconsistent results might be observed.

Therefore, it can be concluded that the CCTDI is the best test to monitor nursing students' critical thinking abilities as it has been shown to be reliable and valid. When looking at its constituent items (truth-seeking, inquisitiveness, systematicity and maturity of judgements), one can say that this test is investigating the characteristics that nurses require. For

inquisitiveness characteristics, this means that nurses should be eager to obtain knowledge as knowledge is an important component of nurses' practice (Profetto-McGrath, 2003). Furthermore, if nurses had a lack of truth-seeking capabilities, this could lead to serious outcomes, as nurses could be unconcerned with looking for the reasons behind changes in patients' status or looking for a diagnosis for certain problems. Systematicity is very important for nurses as they are required to be organised in approaching problems and implementing interventions; this can be seen in nursing care plans that nurses should follow.

2.4. Problem Based Learning

2.4.1. Introduction

The aim of this section is to provide an overview of the history and definitions of Problem Based Learning (PBL); as well as to discuss research done in order to investigate the effectiveness of this method.

2.4.2. The history of the development of problem based learning

In the early 1960s the Ontario provincial government decided to fund the establishment of a medical school in Hamilton. The development of this new school was a consequence of many reasons, one of which was that the 1960s experienced a rapid growth in the number of students who enrolled in medical education. In 1965, Dr Johan Evans was appointed as Dean to the School of Medicine and, by the following year, the school started recruiting faculty members, who were later considered as the founders of the McMaster University Medical School (Neville & Norman, 2007).

According to Barrows (1996), the motivation for a PBL approach was that, with the traditional educational methods, the development of the clinical reasoning skills was

hindered. In addition, another reason was that students had forgotten the basic knowledge they had learned during their first years. This led to designing a new curriculum where clinical reasoning and problem-solving skills would be enhanced. The development of the curriculum was led by a group including Jim Anderson, Howard Barrows, and the dean, Dr John Evans. Students learning and working in small groups was the idea of Professor Jim Anderson. On the other hand, using real life patients' problems to educate medical students was the idea of Howard Barrows, who was a neurologist (Hillen et al., 2010).

This was the birth of PBL in the Medical School of McMaster University. The development of this program was in response to many other factors which were:

- The advancement of medical technology.

- Changes in population attitudes.

- Lack of satisfaction with conventional medical courses.

- The need for taking into consideration social changes and problems.

- Considering this approach as an effective approach for educating medical students.

- The expectation of more knowledge retention and application of acquired knowledge to the clinical setting.

(Saarinen-Rahiika & Binkley, 1998)

The course had eight goals established by the founders of the McMaster Medical School curriculum:

1. To identify and define health problems and to search for information to resolve and manage these problems.

2. To examine the underlying physical or behavioural mechanisms of health problems.

3. To recognise, maintain, and develop personal characteristics and attitudes required for professional life.

4. To develop the clinical skills and learn the methods required to define and manage the health problems of patients.

5. To become a self-directed learner.

6. To be able to critically assess professional activity related to patient care, health care delivery, and medical research.

7. To be able to function as a productive member of a small group.

8. To be aware of, and be able to work in, a variety of health care settings.

(Neville & Norman, 2007, p.371)

The PBL program was described as being flexible; students were responsible for designing their own program, whilst taking into consideration their commitments to group work. They were given the chance of developing goals for their future career independently. Moreover, the course was designed in a way that allowed medical students to select a particular training course after graduation. The PBL curriculum experienced many changes over the years. However, its philosophy, goals, and the majority of course designs remained the same (Neville & Norman, 2007; Saarinen-Rahiika & Binkley, 1998; Neufeld & Barrows, 1974).

The implementation of PBL in other medical schools was sluggish. However, it gradually increased during the 1970s and 1980s, and the 1990s experienced a fast increase in the utilisation of this approach. PBL was implemented in many medical schools in the United States and other countries. This was followed by the adoption of PBL in other educational fields such as nursing, pharmacy, dentistry, science, architecture, and law (Gwendie, 1996).

Many schools, especially ones with a long history, considered developing their own version of PBL, integrating elements of traditional teaching. This was as a result of the faculty members being uncertain about the advantages of PBL. This resulted in many alternative ways of implementing PBL (Barrows, 1996). Barrows (1996) said these different approaches to implementing PBL might lead to the term 'PBL' not being as precise as expected.

Although there are different forms of PBL programs, six fundamental characteristics of PBL can be recognised in the core model explained by Barrows (1996) before PBL was disseminated through medicine and other fields. First, learning should be student-centred, with the tutor guiding students. Second, learning should occur in small groups of students, groups typically formed of five to nine students. Third, the teacher is referred to as a guide or a facilitator. Fourth, real patients' problems (e.g. written cases, simulation, or videos) are the primary focus of the learning process. Fifth, patients' problems should help students gain the ability to solve clinical problems. Sixth, new knowledge is gained through self-directed learning.

Gwendie (1996) argued that, when an innovation is applied by organisations other than the one that originated it, the changes brought about in the application need to be assessed. In other words, it is important to know to what extent the application of this innovation is similar to that of the original organization. The same question is applied to the application of PBL, whether different organisations applied the typical program as produced and applied by the McMaster Medical School or not. Gwendie (1996) held a discussion with experts in PBL, one of whom was Howard Barrows. He said that from their discussion they concluded that any PBL program which does not distribute students in groups of five to ten is not considered as 'pure PBL', not even PBL programs concentrating in individual courses such as pathology,

pharmacology, or physiology without integrating them together. Another factor for not considering a program as 'pure PBL' is the program being teacher-centred instead of being student-centred. With the lack of these factors, the core of 'pure PBL' will be missing. He added other factors detracting from pure PBL, including: when the traditional teaching strategies such as lectures still have the primary focus; when PBL is hidden within other traditional techniques and students do not have the opportunity of experiencing independence; and when the evaluation of students' academic performance relied on the memorisation of content.

Gwendie's (1996) argument concluded with speculating that PBL became a strategy implemented in different medical schools and other institutions. Some might have applied a 'pure' form of PBL; on the other hand, others could make alterations such as mixing PBL with other traditional techniques. Changes in the application of PBL rather than adhering to its original concepts as established by the McMaster Medical School might result in either poor or incomplete implementation of the PBL strategy. The success of these applications depends on whether they led to developments in students' learning and faculty members' education, or whether the approach was seen as unsuccessful.

Saarinen-Rahiika and Binkley (1998) described three different PBL approaches or designs: (a) completely integrated PBL curricula, (b) transitional curricula, and (c) a single-course approach. The integrated PBL curriculum focuses on learning only the contents of the course, utilising case scenarios. The transitional curriculum uses a traditional approach at the initial stages of the course, then self-directed learning and small-group tutorials will be utilised. The single-course approach includes implementing PBL as an individual course. Each approach has its own limitations. The completely integrated PBL curricula may apply too much stress

on students, due to PBL being a new learning strategy for them, with the need to learn a big volume of information. The transitional curriculum is advantageous because it provides the students with a chance to learn to cope gradually with the PBL approach. However, some of the PBL advantages might be lost, because the course contents are not combined with the PBL. Students will not have the chance of linking the scenarios to the course contents. Finally, implementing the PBL as a single course would result in making the contents more clinically based. However, many of the key elements of PBL might not be utilised, like the integration of the course contents.

2.4.3. Problem Based Learning in nursing

PBL is a student-centred approach where students work in small groups to find solutions to problems (Yuan et al., 2009, p.250). PBL was derived from the adult learning theory which says that, to be effective, students require previous knowledge, should have the ability to solve problems and test hypotheses, and apply what they have learned to practise and identify their own learning requirements (Distler, 2007). Therefore, with PBL, students' previous knowledge and experience as well as intellectual abilities are taken into consideration. Students are encouraged to question and evaluate their current information, and search for unknown areas which will increase the students' motivation to learn (Biley & Smith, 1999).

The main aim of PBL is to produce health care professionals who can manage to deal with complex and difficult patient conditions (Papastrat & Wallace, 2003). PBL is a widely-used strategy in nursing education and it is suggested that this strategy enhances critical thinking, encourages self-directed learning, and develops communication skills and problem-solving skills (Yuan et al., 2008a; Tiwari et al., 2006a; Lee et al., 2004). Furthermore, it is considered to help students to link theory to practice, and develop interpersonal interaction with group

members (Raftery et al., 2010; Lee et al., 2004). In PBL, group discussions are considered to make learning more about discovery than simply gaining knowledge, in contrast to traditional teaching methods (Hsu, 2004).

PBL has been defined as 'an instructional method characterized by the use of patients' problems as a context for students to learn problem-solving skills and acquire knowledge about the basic and clinical sciences' (Beers, 2005, p.305). This means that with PBL students will gain the skills of clinical reasoning and gain more knowledge through dealing with problems (Chaves et al., 2006). Papastrat and Wallace (2003) found the PBL process to be similar to critical thinking, as both require students to be able to 'examine data, draw inferences, make deductions, identify assumptions, delineate interpretations, and evaluate weak and strong arguments' (p.460). This supports the authors' claims about the positive effect of PBL on critical thinking abilities.

Linking theoretical material to practice is an important aspect of health professions' education as perceived by Maudsley and Strivens (2000). They referred to that as 'professional knowledge' and considered that it allowed health professionals to practise with high quality. In addition, they identified four components comprising professional knowledge:

- Propositional (knowing that): this means establishing knowledge from different resources including private and community resources, personal experiences, and memories.
- Process (knowing how): this means learning behavioural skills such as self-control, analysing and solving problems, judgement, planning and evaluating.
- Pre-propositional: this includes previous learning through experience.

- Moral attitudes and beliefs established from arts and the literature.

According to Raftery et al. (2010), with PBL the role of teachers will change from 'content expert', who provides knowledge, to 'process expert' (p.211). The latter one might be seen as the teachers' role changing to the 'facilitator role', where students will learn independently instead of being totally dependent on teachers.

2.4.4. The PBL process and methods in nursing education

This section will explain how PBL is implemented in nursing education as described by different authors. With PBL, students will work in small groups. They are supplied with a scenario or a case study that contains real life medical problems. With this strategy students are expected to apply the theoretical knowledge they have learned to the problem presented in the scenario (Popil, 2011; Richardson & Trudeau, 2003). This means that the scenarios are required to go with the course aims, objectives, and contents to optimise their utilisation. The way the scenarios are prepared should promote students to identify problems that exist or that could develop as a result of the condition. Students are expected to collaborate and work together to solve the problem. They will attempt to analyse problems and identify possible causes. In addition, they will be encouraged in trying to find answers to questions raised from the information given, such as sign and symptoms or laboratory values. A leader will be appointed for each group; s/he will be responsible for coordinating the work of the group members. With PBL, students are encouraged to use their previous knowledge from the lectures and experience to help them to identify concepts, find reasons, and identify any further learning requirements. Students are expected to fulfil their learning needs through further study on their own, using the internet, or asking people who are expert, such as nurses and doctors in the clinical area. Finally, students will summarise their findings and what they

have learned, evaluate their experience, and reflect on it. Those findings could be presented in different ways such as open discussion or submitting a report (Distler, 2007; Hsu, 2003; Biley & Smith, 1999; Margeston, 1998).

Price and Price (2000) specified seven steps to be conducted during working on scenarios of a PBL programme:

- Clarifying concepts and terms.

- Defining the problem.

- Analyzing the problem.

- Making a systematic inventory of the explanations that emerged during analysis.

- Formulating learning objectives.

- Gaining further knowledge which is relevant and related to the learning needs.

- Synthesizing the new gained knowledge into the problem solution (p. 258).

These steps are very relevant to those mentioned in the literature reviews about PBL aims and its components, as summarised by Distler (2007), Hsu (2004), and Margeston (1998). Richardson and Trudeau (2003) provided more explanation of the PBL process in nursing education. Their steps seem to explain in detail the Price and Price's steps. Richardson and Trudeau (2003) described the stages in approaching a problem in a nursing PBL programme as follows:

- **Concepts:** this stage reflects the first three steps mentioned by Price and Price (2000). This stage occurs in the first 10 to 15 minutes of the session. Students will be encouraged to identify the concepts that emerge from the problem stated in the scenario. This is usually reached through the signs and symptoms stated which allow

students to identify a specific nursing diagnosis. They mentioned that it is not easy for students to identify the concepts straightaway.

- **Hypothesis:** after students have successfully identified the concepts and stated the problem, they will come up with a hypothesis which will involve the remaining four steps mentioned by Price and Price (2000). In this stage it can be suggested that stating a number of learning objectives and gaining further knowledge will allow students to hypothesise what care is required for the problems discovered. This stage will take approximately 15 minutes.

- **Nursing intervention:** students will finalise the required nursing interventions based on previously suggested hypotheses. Being systematic in doing that and insuring stating the intervention with priorities is very important. This stage should also not take more than 15 minutes.

The Price and Price (2000) and Richardson and Trudeau (2003) explanations of the PBL process can be followed while implementing a PBL programme for nursing students. Their steps are very clear and can be easily introduced to students.

2.4.5. PBL effectiveness

This section aims to discuss research investigating the effectiveness of PBL. Different resources and databases have been searched including MEDLINE, CINAHL, British Index Education, ProQuest education database, ERIC, and Google Scholar. The search resulted in many different studies having investigated the effectiveness of PBL. These studies evaluated the use of PBL either for undergraduate and postgraduate programmes or within clinical areas to improve professional competence. The studies included both quantitative and qualitative

approaches. Qualitative ones were descriptive studies examining the perceptions of students, faculty, nurse leaders, clinicians, and staff nurses. Quantitative studies investigated the effect of PBL on students' critical thinking abilities, and students' grades and performance. Studies were selected based on the following inclusions criteria:

- Qualitative and quantitative studies discussing the general effectiveness of PBL.

- Quantitative studies examining the effectiveness of PBL on critical thinking. Tools used were CCTST and CCTDI, since these tools were frequently used together in the nursing field and the latter one was considered as the preferred tool for examining undergraduate nursing students' critical thinking.

- Study participants are: students, faculty, clinicians, facilitators, and other health professionals.

- Studies focused on teaching by PBL in university or clinical environment.

This section is divided into three sections based on the aim of the selected studies and the nature of the investigations. The first section will discuss studies investigating the general effectiveness of PBL in nurse education. The second section highlights quantitative studies examining the effects of PBL on critical thinking abilities of nursing students, and the third section is concerned with studies evaluating the effects of PBL on students' performance and grades. Figure 2.3 presents the structure of the selection process of relevant papers discussing the effectiveness of PBL.

2.4.5.1. PBL general effectiveness

In a study conducted by Lee et al. (2004) students found the PBL approach to be very enjoyable and it motivated them to search for the required knowledge. Moreover, they

learned to be independent, systematic in analysing problems, and to think critically. Similarly, Morales-Mann and Kaitell (2001) listed PBL outcomes, which included: group work, self-directed learning, restoring knowledge, problem solving, using available resources, learning through research, organising, listening, thinking critically, and proper reasoning. They also mentioned that, with PBL, students feel more motivated as a result of working and participating with the group. Yuan et al. (2009) reported that participants mentioned similar outcomes of PBL, including the following skills: problem solving, thinking, analysing, and working with groups. In a study conducted by Saalu et al. (2010) students preferred the PBL programme over traditional learning. They considered PBL to improve their reflective abilities. They also highlighted previously mentioned outcomes of PBL such as improved critical thinking and providing the chance to obtain more knowledge.

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│ 142 references identified from│          │ 15 references identified from│
│     databases searched       │          │      other sources          │
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          │  81 references selected for   │       │  49 references      │
          │   assessment of eligibility   │──────▶│    excluded         │
          └──────────────────────────────┘       │ Online course.      │
                          │                       │ Engineering PBL.    │
                          │                       │ Environmental       │
                          │                       │ learning.           │
                          │                       │ High school students.│
                          │                       │ Teacher's learning. │
                          ▼                       │ Electrical          │
          ┌──────────────────────────────┐       │ engineering.        │
          │  32 references included in the│       └─────────────────────┘
          │           review              │
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Figure 2.3:   The structure of the selection process of relevant studies discussing the effectiveness of PBL

Stern (1997) claimed that PBL enhances students' personal growth, whereas Cooke and Moyle (2002) found PBL to enhance students' learning, as it helped in applying and integrating present knowledge to what has been learned previously. This resulted in establishing a strong knowledge base. In an earlier study conducted by White et al. (1999), students described PBL as the best learning approach that helped them in their learning. They mentioned that, with PBL, they were able to develop the following abilities: time management, accountability, professionalism, dealing with groups, becoming more organised. Although this study finding is positive, it was said to have some limitations including small size, and possible bias through students being positive about PBL because the faculty members were good and keen to teach students.

Although the findings provide evidence that students found the PBL strategy to be effective, students highlighted certain limitations. Lee et al. (2004) stated that study participants claimed they were not confident in their capacity to cope with the new method. In addition, other students found the PBL work to be very hard, to require much time, and to be totally dependent on self-learning. Similarly in the Yuan et al. (2009) study, students perceived the limited use of books for information to be applying stress on them and require additional time. In another study conducted by Papastrat and Wallace (2003), some students did not like the way they were graded together with the rest of the group rather than individually and found that they worked better alone. Lake's (2001) study participants argued that they learned less than the traditional group, although they obtained higher marks.

Most of the studies mentioned earlier also investigated facilitators' and teachers' attitudes towards PBL. In Papastrat and Wallace's (2003) study, teachers found students to be able to apply knowledge about medication administration to the clinical area and become

independent in their learning. Distler (2007) claimed that teachers pointed out that PBL allowed them to be able to estimate students' clinical performances and evaluate their abilities of performing a process of care, which is difficult to establish through traditional teaching methods.

A significant finding is that implementing the PBL method is challenging not only for students, but also for facilitators. Some facilitators found themselves to be anxious during implementing the PBL, and they were worried that they transferred their anxiety to students (Morales-Mann & Kaitell, 2001). Therefore, it is necessary to have confident and knowledgeable facilitators; this will ease students' fears, inspire them and make them more motivated and confident. In addition, preparing facilitators to implement PBL through conducting workshops would be beneficial. In a study conducted by Raftery et al. (2010) teachers considered that PBL changed their roles from active to passive roles; this was different from what they were used to with traditional teaching. Based on that, they considered this strategy affected their teaching skills negatively. Besides, they were worried about how they would facilitate the PBL process and how frequently they might interrupt and help students during working on scenarios. They were worried about students not working on their own because of a dependence on the facilitator guiding them. Another limitation was that teachers found students did not cope easily with the PBL and still paying attention to teachers' responses to their performance while working.

PBL has also been implemented within clinical areas to either improve nurses' clinical performance or change their attitudes towards certain conditions. In a study conducted by Wong et al. (2001), it was observed that nurses' attitudes towards care of dying patients have changed positively, and even their caring behaviours have improved. Furthermore, PBL was

found to be successful in facilitating nurses' enrolment into acute care areas, and it has improved their critical thinking abilities (Celia & Gordon, 2001). Wilson et al. (2001) investigated the effect of PBL on the clinical practice of physical therapy participants. The results indicated that participants perceived that the PBL improved their clinical practice and problem solving skills. Participants mentioned that, before PBL, they were reliant on the diagnosis made previously by medical staff; taking the initiative to diagnose patients was rare. However, with PBL they were able to diagnose patients according to patients' signs and symptoms. This allowed them to decide on the appropriate treatment for patients. Another important outcome worthy of mention is that participants were able to gain a 'holistic view of patients'. They mentioned that, before PBL, they were concentrating on the physical problem without looking at other aspects such as patients' education, and considering it as an important aspect of treatment. Patients' preferences were also now given attention and considered as a priority. After PBL, respondents considered that designing treatment to fit with patients' preferences was important and might affect their outcome positively.

PBL has its limitations within clinical settings. Price and Price (2000) found that students' autonomy is difficult to achieve because facilitators and instructors cannot refrain from interfering and doing some interventions, as they need to make sure that any action students take does not harm patients. In addition, in a study conducted by Dornan et al. (2005a), it was found that, within the clinical setting, it is hard to establish group work and collaboration, which is the main goal of PBL. Moreover, they found that the 'clinical focus' was lost as a result of implementing PBL within the clinical setting (p.165). This was as a result of students being occupied with the PBL tutorials, which limited their chance to attend clinical teaching. This means that students' chances to improve their clinical skills might be affected negatively.

One of the serious problems with implementing PBL in clinical areas is lack of nurses' understanding of PBL. Adejumo and Ganga-Limando (2000) found that nurse leaders and staff nurses misunderstood the concept of PBL, and this affected the way they evaluated students. Nurses consider PBL students to have less knowledge and skills than the traditional students. As a result, they provided PBL students with fewer marks than the traditional students. However, participants' attitudes towards PBL students improved after they received structured information about the PBL.

The way clinicians misunderstood PBL would affect PBL students' satisfaction with PBL, as students might dislike the PBL strategy and think it may reduce their performance instead of improving it. Arranging orientation programmes and workshops for facilitators and staff within the hospital is important (Williams & Beattie, 2008). Furthermore, it can be argued that establishing good communication between facilitators, nurses, and clinicians within the hospitals is necessary. This would tackle a lot of problems as, if the nurses do not know about PBL, its aim and how it is implemented, this will reduce students' motivation. In addition, nurses will not be able to help students to be independent; a nurse student may come with the scenario given by his/her facilitator and ask the nurses to help him/her with it; the nurse might give the students all the required solutions which will not benefit the student in the long term and will hinder the achievements of the PBL goal.

In summary, it can be argued that research evidence supported the effectiveness of applying PBL to nursing programmes within schools and hospitals. However, PBL would be more effective within academic settings rather than the clinical ones. PBL has been found to be complex and difficult to transfer to the clinical setting. In addition, one cannot ignore the important role of clinicians and nurses in facilitating PBL. Faculty members should

demonstrate good communication with clinicians and staff nurses. This is a very important point which should be taken into consideration before adopting PBL to any curriculum. Furthermore, students require detailed information about PBL and any new teaching method prior to subjecting them to it. This would reduce their fears and could let them accept positively the new teaching strategy. However, faculty should keep in mind that students' perceptions towards PBL may remain negative even if they benefited from the programme.

2.4.5.2. Factors facilitating or hindering PBL

When looking at students' comments reported above, it can be argued that there are many factors which make students feel uncomfortable with PBL, such as inability to cope with this strategy, self-learning, less teaching classes, and group work (Yuan et al., 2009; Lee et al., 2004; Papastrat & Wallace, 2003; Lake, 2001). Those factors could be related to different personalities, different learning styles, and culture. There is a correlation between learning styles and students' problem-solving and critical thinking abilities, which are the core of PBL (Wessel & Williams, 2004). This indicates that, if PBL is implemented in an environment where the learning style is more traditional and students are not encouraged to think, solve problems, and take control over their learning, students will find difficulties in coping with PBL. In addition, students' personalities strongly affect their attitudes towards PBL. Some students may prefer to work on their own rather than working with a group (Papastrat & Wallace, 2003). Therefore, PBL would be more enjoyable for those who like to work in groups.

It is to be expected that difficulties will be experienced when transferring the 'participative style of education' used in Western societies to the Asian cultures (Hussain et al., 2007, p.763). According to Hussain et al. (2007), in the Asian culture learners used to be shy, not

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asking questions, and expected to be loyal to teachers. This supported the perceptions of Lee et al.'s (2004) study participants, where students found themselves anxious about their abilities to cope with the PBL. This study was conducted in a Chinese culture, where students are not used to asking questions and rarely contribute in the class. In addition, they are used to non-analytic learning. Those cultural factors would lead to students being less confident, unable to analyse the information given, or ask questions, which are integral parts of PBL. Additionally, in a culture where students never experienced self-directed learning and are used to being fed the information, students will feel uncomfortable and not confident in their abilities to cope with PBL.

Furthermore, one cannot ignore the effect of teachers' styles on students' confidence in their abilities to take control over their learning and adaptation to new teaching methods such as PBL. Hsu (2004) claimed that there are still teachers who prefer students to be passive learners, and there are even some educators who choose the research topics for nursing students studying in graduate programmes.

Facilitators need to support those who do not find PBL to be enjoyable and ease any difficulties that could face them. In addition, to facilitate students' acceptance of such a change, students need to know not only why they should learn specific information, but also why they are required to learn through using specific methods (Distler, 2007). This can be facilitated through organising workshops prior to implementing PBL programmes.

Even with those suggested solutions, however, students can be expected to experience difficulties such as misunderstanding, tension, anxiety, and lack of security at the beginning of introducing any PBL programme (Raftery et al., 2010; Yuan et al., 2009; Papastrat &

Wallace, 2003).Yuan et al. (2009) considered these negative feelings to be as a result of transferring from the traditional teaching approach to PBL. Students might perceive PBL as an ineffective way of learning. This could be as a result of being used to the habit of passive learning and complete dependence on teachers, as well as being unfamiliar with PBL. Once students are used to the new method, they become confident in their capabilities of analysing and solving the problems (Papastrat & Wallace, 2003; Price & Price, 2000).

2.4.5.3. Measuring the effect of PBL on nursing students' critical thinking abilities: a literature review

Most research literature addressing the outcome of PBL comprises descriptive studies exploring the satisfaction of students, teachers, and instructors with this approach. Those studies were discussed in the previous section. For those studies addressing the effect of PBL on critical thinking, it was decided to highlight studies using the CCTDI and CCTST as outcome measures of critical thinking. The decision was made based on the previously discussed literature about the validity of the CCTDI and its applicability for measuring the critical thinking abilities of undergraduate nursing students. However, the CCTST was also considered since it was often combined with the CCTDI to monitor the thinking skills of students.

The search resulted in few studies using CCTDI and the CCTST to measure the effect of PBL on nursing students' thinking. These studies adopted different designs; only one was a randomised controlled trial (RCT) study. Three adopted the quasi-experimental design, and one was a descriptive analytic study. All studies were conducted recently, the oldest one being published in 2000.

Ozturk et al. (2008) applied a descriptive analytic study to compare the critical thinking dispositions of two different nursing schools in Turkey. One used PBL as a teaching strategy and the other used traditional teaching. The result showed that the PBL group mean total score from the CCTDI was significantly higher than that of the traditional group ($p<0.05$). It was 266 for the PBL group and 255.8 for the traditional group. When subscales' scores of the CCTDI were compared, it was found that the PBL group had significantly higher truth-seeking abilities and open mindedness. Tiwari et al. (2006a) conducted a randomised controlled trial among 79 undergraduate nursing students in Hong Kong, China. Subjects were randomly assigned to a control or lecturing group. The outcome measure tool used was the CCTDI. The test was administered at four times. The first time was before starting the course (pre-test), the second time was at the end of the first semester, the third time was at the completion of the second semester, and the final test was completed two years after starting the research. Comparing the two groups the results reported that there were no significant differences between groups at the first time of administering the test. At the completion of the first semester, the PBL group demonstrated significant improvement in the total score of the CCTDI with an average mean of 276 for the PBL groups and 263.63 for the lecturing group. The test was administered after the end of the second semester, after the completion of the experience with lecturing and PBL. The third results showed that the PBL group had also obtained significantly higher scores, with an average mean of 281.63 for the PBL group and 267.67 for the lecturing group. Additionally, the PBL group still obtained significantly higher scores in the final test two years after the experience of PBL.

Yuan et al. (2008a) conducted a study with a quasi-experimental design among 46 year two nursing students in China. Subjects were divided into a PBL group and lecture-based group and the outcome measure used was the CCTST–A, a Chinese version. Similar to Tiwari et

al.'s (2006a) study finding, there were no significant differences between the pre-test scores of both groups. However, the post-test results showed that the PBL group demonstrated a significantly higher increase in their critical thinking skills with a mean score of 20.83. Moreover, Day and Williams (2000) conducted a one-year pre-test, post-test quasi-experimental study among 27 first year baccalaureate nursing students in Canada, who were enrolled in a four-year PBL nursing programme. This study has no traditional group; all participants were subjected to PBL only. Students' critical thinking was evaluated at entry and at the end of the first year. The CCTDI and CCTST were used to monitor students' thinking. The result showed that students' thinking dispositions and skills had significantly increased. Only one study reported a different finding from previous studies. Choi (2004) found that PBL did not enhance nursing students' thinking. This study was conducted among 76 students in Korea and adopted a non-randomised quasi-experimental design. The CCTST was used to measure thinking abilities. Choi's (2004) study might have provided further evidence that the CCTST is not applicable for university students. In addition, the PBL programme was conducted over one semester, which may not be long enough to allow the effect of this strategy to appear.

Clearly, there is a lack of experimental studies concerned with investigating the influence of PBL on critical thinking. Researches using the CCTDI or CCTST in the nursing field are few and the most recent study was conducted in 2008. However, most studies agreed that PBL does improve nursing students' critical thinking. Only one study said that the PBL does not improve critical thinking. Although most studies have a small sample size and in most studies the PBL course was conducted for a short period of time (one or two semesters), a positive effect on students' thinking was found. In conclusion, it can be argued that, due to the lack of studies investigating the effect of PBL on students' thinking development, the PBL strategy is

still in debate and further studies investigating the effect of PBL on critical thinking are required (Yuan, et al., 2008b).

2.4.5.4. Measuring the effect of PBL on nursing students' academic performance: a literature review

Regarding the effect of PBL on students' knowledge and academic performance, most studies conducted among nursing students showed that there were no significant differences between the PBL and lecturing groups' performances (Lyons, 2006; Beers, 2005; Rideout et al., 2002; Newman, 1995).

It was observed that most studies examining the effect of PBL on academic performance used test scores and examination records to detect the PBL effect. Based on these studies' findings, researchers recommended the following:

- Traditional measurement methods are incapable of detecting the effect of PBL.

- It is better to study the effect of PBL and any other teaching method on other variables such as critical thinking abilities and problem-solving skills rather than students' marks/grades.

- Studies should concentrate on students' attitudes towards PBL rather than the learning outcome.

- Students' attitudes require investigation, so that if any negative attitudes about PBL or misunderstandings are found they can be addressed.

- It is better to evaluate the effect of PBL later rather than immediately after a PBL programme as the PBL effect will not appear in the short term; it will be more obvious one year or more later.

(Beers, 2005; Berkson, 1993)

Three studies showed a significant effect of PBL on nursing students' academic performance. Hwang and Kim (2006) compared the knowledge of a PBL and a lecturing group using a test made of 32 questions covering adult care nursing. In their study, the pre-test results showed no difference between the PBL and lecturing group. However, the post-test results indicated that PBL group participants had a significantly higher performance than the lecturing group.

Alexander et al. (2002) examined the academic performance of undergraduate nursing students subjected to a PBL programme. The PBL was applied to three courses: community health nursing, statistics for health professionals, and pathophysiology. At the end of courses, students' evaluation records showed that their grades in all three courses were between 4.5 and 5, which are considered to be high. Moreover, students were tested at the start and end of the semester by a multiple choice exam consisting of critical thinking questions. Their results indicated that students had significantly increased their grades (p=0.001). They also completed the National Council Licensure Examination (NCLEX) and all were able to obtain exceptional scores. Furthermore, students who graduated from this programme succeeded in getting jobs in clinical areas that require clinical experience, including critical care and emergency areas.

Arthur (2001) examined the knowledge of second-year undergraduate nursing students studying a five-week course about 'Alcohol Early Intervention Education'. The study design was pre-/post-test quasi-experiment. Study participants were experienced students who worked as registered nurses and pre-registered nursing students with less experience. The pre-test result indicated that there was no difference in the performance of experienced and less experienced students. However, the findings showed that both groups significantly

improved their knowledge, which indicated that the programme had succeeded in enhancing students' knowledge towards alcohol early intervention, regardless of their experiences.

Other studies which established positive effects of PBL on students' performances were not conducted within the nursing field. In a recent study conducted by Saalu et al. (2010), it was found that PBL had significantly improved medical students' performance in exams. The PBL group had significantly higher grades than the traditional group. Authors considered the PBL to enhance knowledge retention and increase students' memory.

Iputo and Kwizera (2005) reviewed the records of two groups of medical students who were taught by two different approaches (PBL approach and a traditional approach) since the beginning of a medical programme. The records revealed that PBL students' performances were significantly higher than those taught in the traditional style. Furthermore, a considerable number of the traditional style students left the course before completion (34 out of 149); meanwhile, among the PBL group, around half of that number left their courses (15 out of 145). A greater proportion of the PBL group completed the programme within the normal time period than did the traditional group.

Lake (2001) conducted a study among first-year undergraduate physical therapy students. The study aimed to compare an active learning group to a lecturing group. The active learning approach used was group discussion and reading assignments. The result showed that the active learning group's grades were higher than those of the lecture group. McGee (2003) investigated the academic performance of a traditional group and a PBL group who studied in an athletic training course. In this study, the researcher used an essay examination to evaluate students' problem-solving abilities, and a multiple choice examination to evaluate

students' knowledge retention. The multiple choice examination result did not show any statistically significant differences between the two groups. However, students' performance in the essay examination indicated that the PBL group had significantly higher scores than the traditional learning group. This study finding further supports PBL learning effectiveness not being monitored by traditional examinations that assess knowledge. Other examination methods that examine critical thinking and problem-solving skills are needed (Beers, 2005).

2.5. Conclusion

This chapter discussed the literature about students' approaches to learning, critical thinking, and PBL. The literature indicates students' learning approaches are affected by many different factors. Students' perception of their learning context, the teaching style, and assessment methods are found to have a strong effect on the development of deep learning and surface learning approaches. In addition, other factors such as personality, age, and experience could affect the development of learning approaches. The literature suggests that the traditional teaching methods might result in surface learning. However, using active learning approaches such as PBL will contribute to the development of deep learning, which is considered to contribute to high quality learning.

The literature showed that there are many different definitions for the term 'critical thinking'. In addition, there is no standardised way for teaching and enhancing critical thinking. However, this skill is necessary for nursing practice. The literature demonstrates that there are many different tools for monitoring critical thinking abilities. However, not all tools might be applicable for monitoring nursing students' critical thinking abilities, due to factors such as the length of the assessment tool or as a result of inconsistent or insignificant results. Careful examination of the literature on critical thinking measurement tools suggested that

the CCTDI is the best tool for monitoring nursing students' critical thinking, since it is valid and reliable.

Studies which discussed the effectiveness of problem-based learning found indications that the PBL is an effective strategy for improving nursing students' personal, academic, and critical thinking abilities. This could be related to many factors, the most important being that the PBL depends on case studies. Case studies enhance students' thinking through helping them to use theoretical materials to solve problems. They are described as 'food for thought' that allow students to use their thinking; they allow students to think, ask questions, and find answers using their knowledge (Popil, 2011, p.206). However, there were certain limitations highlighted, and difficulties might be experienced by students or facilitators. Moreover, the PBL might be more applicable to classrooms rather than clinical settings. Establishing and facilitating the essential elements of PBL such as group work within the clinical area might be difficult.

Looking at the quantitative studies which investigated the effect of PBL on nursing students' critical thinking, few studies used the CCTDI. Most concluded that the PBL significantly improved students' critical thinking abilities. Regarding the effect of PBL on nursing students' grades and performance, few studies conducted on nursing students showed significant improvement of students' grades as a result of PBL. On the other hand, most studies which did show a positive effect of PBL on students' grades and performance were conducted within other medical and health profession fields. This raised an important question, which is: does the PBL increase nursing students' knowledge retention or not? There might be a reason for the disparity in results, such as the way the PBL was conducted within the nursing field being different from that within other fields. Another reason could be

that facilitators acted differently in dealing and encouraging students or the materials used in each PBL programme were different. Alternatively, it could be that nursing students' thinking abilities being developed as a result of PBL had negatively affected their performance in exams. Students could be using their thinking to answer questions in a style not matching the traditional style of the examination questions. Therefore, it might be suggested that the exam materials need to be modified to match the aims and expected outcomes of PBL.

All previous findings suggested that further research investigating the effectiveness of PBL on students' thinking abilities and performance is required. This might require examining factors which might affect the development of thinking skills, such as culture and participants' characteristics such as age and background. The next chapter will discuss different paradigmatic and methodological issues that will be raised when research is conducted. In addition, it will present the methodology adopted for this study.

Chapter 3: Methodology and Methods

3.1. Philosophical assumptions underpinning the selected methodology of this study

3.1.1. Introduction

Theoretical perspectives are essential components of research methodology which guide the research process (Crotty, 2003). A common question asked of researchers is whether their study is adopting a quantitative or a qualitative approach (Mackenzie & Knipe, 2006). There have been ongoing intense debates about the relative merits of these two approaches (Hammersley & Atkinson, 2007; Onwuegbuzie & Leech, 2005a); and often portrayed as a struggle between two different philosophical assumptions or paradigms, which are 'positivism' and 'constructivism', the first being concerned with quantitative methods and the second with qualitative methods (Tashakkori & Teddlie, 1998). Other terms emerged which are associated with qualitative research, such as interpretivism (Creswell, 2003; Bryman, 1988). Purists consider quantitative and qualitative methods as incompatible, and argue that researchers will not succeed in bringing these two methods together. However, it has been argued that discrepancies between positivist and constructivist paradigms are not as great as have been perceived. The pragmatist paradigm circumvents the incompatibility between these two paradigms, in which this approach brings qualitative and quantitative methods together (mixed methods approach) (Mackenzie & Knipe, 2006; Tashakkori & Teddlie, 1998).

This section will discuss philosophical issues behind the selected methodology for this study. Different philosophical assumptions or paradigms will be discussed, particularly positivism, post-positivism, interpretivism, and pragmatism. Various definitions and explanations as proposed by different authors will be given. These include discussing the implications that these philosophical approaches would have for choosing a quantitative or qualitative

approach, or mixed methods. A section discussing quantitative, qualitative, and mixed methods approaches and their role in conducting a research will be presented.

3.1.2. Research paradigms

'Paradigm', 'methodology', and 'methods' are common terms usually associated with the research design. These aspects help the researchers with deciding on the research approach they will undertake, starting from discussing a wide range of assumptions to the decision on how data will be gathered and analysed (Creswell, 2003). Table 3.1 provides a brief description of each one. However, it might be necessary to discuss the term 'paradigm' in more detail.

The term 'paradigm' has been described by Bogdan and Biklen (1998) as 'a loose collection of logically related assumptions, concepts, or propositions that orient thinking and research' (p.22). Denzin and Lincoln (1998) described a paradigm as 'a worldview that defines, for its holder, the nature of the "world", the individual's place in it, and the range of possible relationships to the world and its parts' (p.200). In addition, they argued that a paradigm is formed of 'basic beliefs' that should be accepted (however, they can be questioned). Therefore, it might be argued that a paradigm is made up of three fundamental inquiries, which are: ontology, epistemology, and methodology. The ontological inquiry is concerned with 'the nature of reality'. The epistemological inquiry is about 'How do we know the world? What is the relationship between the inquirer and the known?' The methodological inquiry asks 'How do we gain knowledge about the world?' (Denzin & Lincoln, 1998, p.185). Alternatively, Creswell (2003) referred to a paradigm as 'knowledge claim' and described that as 'how individuals will learn and what they will learn during their inquiry' (p.6).

Table 3.1: Description of terminologies considered when designing a research project (adopted from the work of Creswell (2009), Denzin and Lincoln (2005), and Denzin and Lincoln (1998))

Terminology	Description	Examples
Paradigm	A worldview Basic beliefs A 'loose collection of logically related assumptions, concepts, or propositions that orient thinking and research' It is also referred to as a knowledge claim, philosophical assumption, epistemology or ontology	Positivism Post-positivism Constructivism
Methodology	Strategies or action plans that direct our decision on methods will be used to collect data and generate outcomes.	Experiments Surveys Ethnography
Methods	Procedures and tools used to collect data.	Interviews Focus groups Questionnaires

3.1.2.1. Positivism

The foundation of positivism goes back to a century ago. It was established by Auguste Comte and Herbert Spencer who are recognised as the fathers of this paradigm (Parahoo, 2006). Positivism came from the assumption that the world is governed by universal laws and theories, and exploring these theories or laws allows researchers to understand social events (Cresswell, 2003). It is also referred to as a 'scientific method' and it is influenced by the development of natural sciences, particularly physics and chemistry (Mackenzie & Knipe, 2006; Parahoo, 2006; Kim, 2003). Positivism involves 'the belief that the methods of natural sciences are appropriate for the social sciences' (Bryman, 1988, p.14). With this approach,

method is about examining hypotheses or theory. In addition, with this approach there is a strong relationship between discovering and reasoning (Hammersley & Atkinson, 2007).

According to Hammersley and Atkinson (2007), for positivists the most important characteristic of scientific theories is that they are open, can be tested, and either supported or refuted. With this, variables must be controlled through using experiments or surveys, where statistical control will be applied. This means that, if no control over variables is applied, causal relationships cannot be proved, because there are no specific criteria for how to test hypotheses. Therefore, with positivism, testing is about identifying if what the theory says is likely to happen under certain conditions (Hammersley & Atkinson, 2007). Positivism is reductionist, in which complex phenomena are dissected into small simple portions to study and understand. An example of that are the variables that form in research questions and hypotheses (Creswell, 2009; Parahoo, 2006).

May (2001) argued that 'positivism explains human behaviours in terms of cause and effect' (p.10). It has been also referred to as 'causal relationships', and aims to identify how manipulation in one variable will lead to a change in another (Kim, 2003). This means the setting is artificial and data will be collected from individuals' responses to the change applied to their environment (May, 2001). Moreover, with this philosophy the positivists' concern is observable phenomena. This means events must be observed either directly through experience or indirectly through using instruments. This condition limits the chance of including any knowledge obtained through 'subjective experience' or 'feelings' unless they can be observed and measured (Bryman, 1988).

In social science, conventional positivists set four criteria for research inquiry; internal validity – to what extent findings reflect phenomena under investigation; external validity – to what extent findings can be generalised to a similar setting to that where the study has been conducted; reliability – replication of the study findings by another researcher; and objectivity, referring to whether the findings are 'free from bias' (Denzin & Lincoln, 1998, p.186).

3.1.2.2. Post-positivism

Positivism has given rise to 'post-positivism'. This reflects 'thinking after positivism' and it challenges the traditional notion of the absolute truth of knowledge (Creswell, 2009, p.6-7). Moreover, this philosophy has emerged from the assumption that any research is affected by a wide range of well-defined theories, in addition to the one under investigation. Besides, it has been speculated that this new version of positivism comes into line with the constructivist theory in which post-positivist philosophy considers the world as ambiguous, with various realities (Mackenzie & Knipe, 2006). Supporters of post-positivism suggest that cause and effect are not an absolute way for obtaining knowledge (Maciones & Plummer, 2005; Pearson & Fitzgerald, 2005). However, this can be replaced by establishing relationships between variables (correlational studies). Moreover, post-positivism suggests that not all phenomena are observable (e.g. satisfaction and anxiety). Therefore, the use of self-reporting measurement tools is required (Parahoo, 2006).

Post-positivism takes into consideration internal and external factors that might affect researchers' actions, as well as innate influences; this is different from positivism, which stresses applying control over variables (Hammersley & Atkinson, 2007; Denzin & Lincoln, 1998; Hassard, 1995). Therefore, events can be examined through using alternative methods

(Thomas, 2003). Seal (1999) suggested that the post-positivism is for positivist researchers concerned with quantitative criteria or looking for causal relationships; including the criteria of interpretivism, which are meaning and subjectivity.

A divergent view of post-positivism was given by Creswell and Clark (2011) and Creswell (2003), who argued that post-positivism is intertwined with quantitative research. In their opinion, knowledge will be gained through (1) determining a cause and effect relationship; (2) reducing ideas into small sections; (3) establishing numerical measures to study and observe human behaviours; (4) verifying theories. It might be argued that this philosophy is more compatible with positivism and quantitative research, but qualitative research may be included (Mackenzie & Knipe, 2006; Parahoo, 2006).

3.1.2.3. Interpretivism qualitative paradigm

Although positivism has been historically considered as a dominant approach, interpretivism gained more popularity and is considered as important as positivism (Walsham, 1995). This paradigm rejects the positivist claim, and beliefs that 'reality is not objectively determined, but subjectively socially constructed' by its population (Tuli, 2011, p.99; Parahoo, 2006; Kelliher, 2005, p.123). It suggests that placing individuals within their own social environment allows for understanding their behaviours (Parahoo, 2006). Furthermore, interpretive researchers are 'naturalists', because they study 'real-world' conditions without manipulation or applying control (Tuli, 2011).

The primary concern of interpretivism is peoples' experiences and views. This approach relies on researchers' interaction with subjects under study (Tuli, 2011; Parahoo, 2006). Researchers' engagement with subjects may result in detailed descriptions, and more deep

and rich information. Therefore, interpretive researchers adopt tools that allow them to collect detailed data from subjects, and that give them the freedom to talk about their experiences (Tuli, 2011). Researchers require many strategies to collect data, including: asking, feeling, listening, observing, and recording (Decrop, 2004).

The interpretivist approach has been questioned for its ability to generate valid and reliable findings (Kelliher, 2005). This might be related to people perceiving things differently. They attach different meanings to the same actions or circumstances (Williams, 2000). Denzin (1983) argued that there is an 'inherent indeterminateness in the life world' (p.133). This causes inconsistencies and affects the generalisation of findings (Williams, 2000). Nevertheless, Parahoo (2006) considered divergent views to be advantageous; they provide a chance of reflecting and negotiating.

In response to the criticism of the interpretive approach, Lincoln and Guba (1985) established criteria for assessing the validity and reliability of the qualitative inquiry. They referred to that as 'trustworthiness' criteria. Based on their criteria, in order to establish a trustworthiness of a study, five essential components must be achieved, which are: credibility, dependability, confirmability, transferability, and authenticity (Polit & Beck, 2008; Guba & Lincoln, 1994, p.114). Detailed explanation and discussion of these criteria, and qualitative research validity and reliability will be demonstrated in the methodological considerations section under 'rigour and validity in qualitative research'.

3.1.2.4. Pragmatist paradigm

Pragmatism is considered as the theoretical framework for mixed-methods (Mackenzie & Knipe, 2006). This paradigm blends the 'vision of an ordered and understandable world with

a passing glance to plurality and social constructivism' (Trinder, 1996, p.236). Pragmatist researchers focus on the 'what' and 'how' of the research problem (Creswell, 2009). Pragmatism is problem-centred; it provides attention to the problem and adopts all approaches that will help with understanding the problem (Creswell, 2009). Moreover, with this approach the research question and techniques (data collection and analysis) form the basis of the research and are more likely to provide insights instead of the ontological or epistemological basis (no philosophical loyalty) (Mackenzie & Knipe, 2006; Trinder. 1996). With pragmatism, researchers would prefer to use a non-experimental quantitative approach to collect data, such as surveys and tests. In addition, qualitative methods will be included as secondary or additional approaches to data collection (mixed methods) (Trinder. 1996). They tend to utilise qualitative methods to describe quantitative data and vice versa (Onwuegbuzie & Leech, 2005b)

Pragmatism provides advantages to researchers who use this approach. It allows researchers to become more flexible in selecting methods that will help them in addressing a wide range of research questions. Pragmatists are more likely to establish a partnership with different researchers, who are from different philosophical schools. Pragmatic researchers consider research as a 'holistic' approach that entails prolonged involvement, multiple examinations, and triangulation. Within one particular study, researchers can combine their primary concerns with the voice and concerns of subjects (Onwuegbuzie & Leech, 2005b).

3.1.3. Conclusion: ontological, epistemological, and methodological differences between paradigms

This section discussed the paradigmatic issues and how they inform a research. It discussed differences between different philosophical assumptions; mainly highlighting differences and contradictions between the positivists and interpretivist paradigms, and how the pragmatism paradigm came about by bringing these two different philosophical assumptions together.

It might be useful to summarise how paradigms differ from each other ontologically, epistemologically, and methodologically. The previous discussion indicated that the positivist paradigm mainly adopts quantitative methods, whilst the interpretivist paradigm predominantly uses qualitative methods. The ontological difference between the two paradigms involves how reality is perceived. Positivists propose that only a single reality exists, whilst interpretivists propose that there are multiple realities, which result in various meanings for various people. The epistemological difference between the positivist and interpretivist paradigms is in the interaction between the investigator and subjects. With interpretivsim the researcher will benefit from his/her interaction with people under study, whilst positivism emphasises that the investigator should be detached from the study context (Teddlie & Tashakkori, 2009; Mackenzie & Knipe, 2006; Onwuegbuzie & Leech, 2005a). Post-positivism is an extension of the positivism paradigm. Methodologically, this approach is primarily quantitative. However, qualitative methods can be utilised (Teddlie & Tashakkori, 2009; Mackenzie & Knipe, 2006). Ontologically, this paradigm believes that reality is probabilistic, and that epistemologically it is characterised by objectivity, with 'modified dualism' characteristics (Teddlie & Tashakkori, 2009; Guba & Lincoln, 2005).

The pragmatic paradigm applies mixed methods; it utilises both quantitative and qualitative methods in a single study. Moreover, the ontological view of pragmatists suggests that there are different views about social reality, every individual sees reality according to his or her own standards. Epistemologically, this approach is either subjective or objective, based on the phase of the research and the research inquiry (Creswell & Clark, 2011; Teddlie & Tashakkori, 2009). Table 3.2 summarises the differences between the above paradigms.

Table 3.2: Differences between four important research paradigms (adopted from the work of Creswell and Clark (2011), Mackenzie and Knipe (2006), Guba and Lincoln (2005), Onwuegbuzie and Leech, (2005a), and Creswell (2003, 2009)).

Areas of comparison	Positivism	Post-positivism	Interpretivism	Pragmatism
Basic characteristics	Determination & Reductionism Careful observation (directly or indirectly) Theory verification	Probable prediction Human phenomena are not observable, but can be studied by means of self-report (using reliable and valid measurement tools) Theory falsification	Understanding Multiple and different meanings for different participants Theory generation	No philosophical loyalty Series of actions Problem-centred Pluralistic Real-world practice oriented
Logic	Hypothetico-deductive	Hypothetico-deductive	Inductive	Both hypothetico-deductive and inductive
Ontology	Single/Naïve reality – 'real' reality but apprehensible	Critical reality – 'real' reality but only imperfectly and probabilistically apprehensible	Multiple, socially constructed reality	Different views about socially reality/best explanation within personal value systems

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Areas of comparison	Positivism	Post-positivism	Interpretivism	Pragmatism
Epistemology	Objective/dualist (knower and known are independent) Findings are true	Objective/modified dualist Findings are probably true	Subjective Co-created findings	Both objective and subjective. Depending on stage of the research
Methods	Chiefly quantitative	Quantitative (qualitative methods can be used)	Qualitative	Qualitative and/or quantitative (mixed methods) Methods selected will be based on the research purpose, questions, and stage.
Methodology	Experimental	Modified experimental Correlational	Phenomenological Hermeneutic Interpretivist	Combining qualitative and quantitative methodology
Examples of tools	Experiments Quasi-experiments Tests Scales	Experiments Quasi-experiments Tests Scales Self-reporting tools	Interviews Observation Documents review Visual data analysis	Tools from positivist and interpretivist paradigms can be used, such as observations, interviews and experiments

3.2. Methodological considerations

3.2.1. Quantitative research

Quantitative research is defined as 'empirical research where the data are in the form of numbers' (Punch, 2006, p.3). This approach is relevant to natural science and particularly reflects the positivism school of thought (Yates, 1998; Bryman, 1984). Furthermore, it tends to test a hypothesis or a theory (Wellington & Szczerbinski, 2007). Quantitative research aims to generate 'general statements' or 'laws', which are applicable to different settings and different populations (Yates, 1998). In addition, this approach is objective; it tends to control the effect of the researcher on the study context. Therefore, distance between the researchers and observed context is maintained (Burns & Grove, 2005; Yates, 1998; Bryman, 1984).

With quantitative research, standardised methods are used to gather and statistically analyse data (Johnson & Onwuegbuzie, 2004). Burns and Grove (2005) classified quantitative research into four main types, which are: descriptive, correlational, experimental, and quasi-experimental studies. Each type will be described separately within the following subsections.

3.2.1.1. Descriptive studies

Descriptive studies are observing, examining, and describing specific phenomena within a natural setting. With this design researchers will be able to gather information, clarify concepts, and learn new meanings. This approach is considered as an initial step of developing a theory or generating hypotheses which will provide a ground for conducting quantitative studies (Polit & Beck, 2008; Burns & Grove, 2003).

3.2.1.2. Correlational studies

Correlational studies' design aim is 'to explain the nature of relationships in the real world, not to determine cause and effect' (Burns & Grove, 2003, p.28). Moreover, it is used when researchers are trying to examine a causal effect of an independent variable that cannot be manipulated. This design monitors the degree in which variables are related to each other; a difference in a single variable might lead to a difference in another one (Polit & Beck, 2008). Variable relationships range from +1 to -1. Positive relationships mean that variables are highly related to each other (rising and declining together). On the other hand, negative relationships mean that variables change with each other, in a contradictory way. This means if one variable rises the other one will decline. A score of 0 means that there is no association between variables. Correlational studies are useful for researchers who are interested in experimental research because they will form hypotheses that will direct them during their examination of causal relationships (Burns & Grove, 2003).

3.2.1.3. Experimental studies

Experimental studies aim to determine cause and effect relationships. They seek to identify whether manipulation of, or a change in an independent variable, will lead to a change in a dependant variable (Polit & Beck, 2008). It is known as the strongest quantitative method, because variables are highly controlled (Burns & Grove, 2003). Subjects will be randomly assigned to a control and intervention (or treatment) group. The intervention group will be subjected to a treatment, whilst the control group will not (Neuman, 2000; Bryman, 1988). In a 'true' experimental study, random distribution of subjects is central, because this will provide each group member with an equal chance of being in any of the groups. In addition, this will increase the chance of having balanced or similar groups (Kalof et al., 2008).

The research environment will be controlled by the researcher. Therefore, any variances between the control and intervention group will be as a result of the intervention only, because the two groups' characteristics will be comparable (Neuman, 2000; Bryman, 1988).

Although experimental research (an experiment or randomised controlled trial (RCT)) is recognised as a 'gold standard', because of its ability to establish reliable results (Wellington & Szczerbinski, 2007; Burns & Grove, 2003), this approach has its own limitations. With experimental studies, it is difficult to recruit a 'genuinely randomised group' (p.22). Experimental studies need a large number of participants in order to be able to properly randomise participants (Wellington & Szczerbinski, 2007). A large sample size provides the chance of obtaining findings which can be generalised to the wider population; 'the larger the sample, the more representative of the population it is likely to be' (Polit & Beck, 2009; Polit & Beck, 2008, p.348). The best way to determine the required sample size is using a technique named 'power analyses'. However, this requires knowledge of statistics (Polit & Beck, 2008).

Experimental design is also criticised for being 'reductionist', as well as 'artificial', in that the researcher will only deal with variables that can be manipulated (Polit & Beck, 2008). Moreover, this approach is risky and potentially dangerous for investigators who strongly believe that the treatment is effective. They may start by applying the treatment and concentrate only on finding an effect, which may not exist. Experimental research has its own ethical limitations within the educational and medical settings. This approach might be considered unethical if one group received a treatment whilst the other group did not (Wellington & Szczerbinski, 2007).

3.2.1.4. Quasi-experimental studies

An alternative to experimental research is a quasi-experimental research. Quasi-experiments are similar to experiments in terms of their aim, which is looking for causal relationships (Burns & Grove, 2005). However, the treatment and control groups are not comparable, because they are not distributed randomly (Kalof et al., 2008). Furthermore, this approach applies a slight control over all variables. Therefore, the presence of confounding variables might reduce the chance of establishing a cause and effect relationships and hence threaten internal validity (Burns & Grove, 2007; Burns & Grove, 2005; Blenner, 1995).

Quasi-experiments are more practical and applicable when subjects prefer to participate without being randomly assigned to groups, or if they are not happy with their treatment being completely controlled or if randomisation is not possible. Polit and Beck (2008) argued that, if subjects were given the chance not to be randomised, this would increase the chance of recruiting a larger number of subjects to join the study than with randomisation. Consequently, the generalisability of the study findings will be enhanced. However, findings would always be less significant. As a result, investigators adopting quasi-experiments in their studies must be aware of the limitations of this design, and try to reduce them, or take them into consideration during the interpretation of findings (Polit & Beck, 2008).

3.2.2. Qualitative research

Qualitative research is defined as 'a systematic, subjective approach used to describe life experiences and give them meaning' (Burns & Grove, 2003, p.356). With this approach, specific phenomena will be described as seen by subjects under study, incorporating the view of the researcher (Burns & Grove, 2003; Bryman, 1988). Qualitative research is flexible and more open than quantitative research, where researchers demonstrate objectivity, adhere to

specific standards, and use quantifiable measurements (Flick et al., 2004). Openness with qualitative research provides the chance of accessing information that might be difficult to access with inflexible standardised strategies (Bryman, 1988). Moreover, data will be collected from subjects within the context where they experienced the issue under investigation (Creswell, 2009). This might also lead to accessing unforeseen information that might be useful and interesting (Bryman, 1988). Researchers play a major role; they are considered as the 'key instrument' (Creswell, 2009, p.175). Data are gathered through documenting, observing, or interviewing (Creswell, 2009).

Through using an inductive approach, researchers generate theories. They are not limited by theoretical frameworks as with quantitative research (Polit & Beck, 2008; Bryman, 1988). Nevertheless, every type of qualitative research will follow a specific philosophy. The philosophy will help with deciding the type of research questions and observations to be done and the approach to interpretation of collected data (Burns & Grove, 2003).

With qualitative research, the researcher can use more than a single resource to collect information. The most frequently used methods are observations, interviews, and document examination. The researchers will go through all collected information, develop transcripts where necessary, and conduct analysis to identify themes that are common to all collected resources (Creswell, 2009; Burns & Grove, 2003).

Qualitative research is classified either according to the kind of analysis used or the researcher's focus. However, a practical approach is classifying qualitative research based on 'disciplinary tradition', in which qualitative research classification is grounded on the kind of questions to be asked and the methods most applicable to answering these questions (Polit &

Beck, 2008; Mason, 2002). Established research traditions offer a theoretical framework for studies with qualitative design; they originated in anthropology, psychology, and sociology (Polit & Beck, 2008, p.222). The next section will highlight five of the most common qualitative research designs which are: ethnography, grounded theory, phenomenology, case studies, and narrative research.

3.2.2.1. Qualitative research designs

3.2.2.1.1. Ethnography

Ethnography comes from the anthropological school of thought (Blenner, 1995). It focuses on studying the culture of a group of individuals within their natural environment, and it requires a prolonged involvement of the investigator with the subjects in order to understand their cultural and social patterns (Creswell, 2009; Goulding, 2005). Ethnographers rely initially on observations of subjects and interviews (Creswell, 2009; Denzin & Lincoln, 1998).

3.2.2.1.2. Grounded theory

Grounded theory was established by sociologists and originated from the symbolic interactionism paradigm (Blenner, 1995). This paradigm concentrates on how people know the world around them. It suggests that individuals tend to interpret others' behaviours. Therefore, human behaviours are goal-oriented, and develop from individuals' social involvement, either verbally or non-verbally. The concept of symbols is fundamental for this theory, and might be referred to as a stimulus existing within certain values. Individuals will respond to this stimulus based on its perceived value and meaning (Goulding, 2005; Solomon, 1983). Therefore, meanings might vary from one person to another. On the other hand, individuals who live within the same social context might share the same meanings as a result of social involvement with each other (Burns & Grove, 2005).

With grounded theory, the researcher 'derives a general, abstract theory of a process, action, or interaction grounded on the views of participants' (Creswell, 2009, p.13). With this approach, data will be gathered and analysed simultaneously. Theory generated will help researchers with accessing relevant theories and literature applicable to the generated data and concepts. Through this they will explore essential patterns of specific social phenomena (Goulding, 2005; Blenner, 1995).

3.2.2.1.3. Phenomenology

Phenomenology is a qualitative approach which aims to explore and understand the lived experiences of people. This led to recognising phenomenology as a philosophy, as well as a methodology (Creswell, 2009). This approach is closely related to 'hermeneutics', in which societies, cultures, and political issues will be understood through interpreting and understanding individuals' experiences. Hermeneutics is concerned with meanings and interpretations; how people who are habituated to certain social and historical conditions describe their experiences within their living environment (Polit & Beck, 2008).

3.2.2.1. 4. Case studies

In case study design the researcher will examine one person or a group of individuals. Institutions can be examined such as hospitals, and the researcher can include more than one data gathering method, such as archives reviewing, observing, interviewing, and surveys. Results can be in the form of numbers (quantitative), or interpretations (qualitative). With case studies the main focus is the case itself, and knowing why a person is thinking or reacting in certain ways. Case study design aims to investigate patterns that are important to the history, progress, and the condition of the entity being studied. Data gathered will be those concerned with the subject experience, either current or previous, as well as contextual

influences related to the issue under investigation (Polit & Beck, 2008; Nieswiadomy, 1993; Eisenhardt, 1989).

3.2.2.1. 5. Narrative research

With narrative research, narrators tell stories that they consider as meaningful (Moen, 2006). Narrative research is about understanding one's own and other individuals' behaviours. Events will be organised to provide meaning and convey a series of actions and experiences in a form of stories. The researcher will display the perceptions of participants, primarily telling why a story is important to tell. Participants will inform their feelings, views, and their understandings. Narrative research values the individuality of human behaviours, and considers every story told as unique. However, stories told are considered as being socially, culturally, and historically constructed. Therefore, narrative researchers take into consideration that individuals' stories might be comparable or variant (Chase, 2005).

With this approach participants are viewed as collaborators rather than informants, whose answers will be directed by questions asked by researchers. The researchers will discuss and review the narratives with the people who are involved in them, to form a relationship between aspects of the information gathered. Different methods can be used to collect data, such as interviews, field notes, observations, letters, journal documents, pictures, and videotape recording (Moen, 2006).

3.2.2.2. Subjects' reflective journals as a qualitative research method

Researchers' reflective journals are well recognised as a qualitative method. However, there is little known about using subjects' journals as an approach of gathering data (Jacelon & Imperio, 2005). Subjects' reflective journals are used to collect information about individuals' behaviours and details about their day-to-day practices. This method is considered to have many benefits than other qualitative approaches: firstly, it is a source of gathering extensive and reliable information; secondly, it provides the subjects with the chance of discussing sensitive matters that might be difficult to tell in face-to-face interviews; thirdly, it is considered as supplementary to other data collection methods such as interviews (Corti, 1993). Reflective journals provide many benefits as a data collection tool. They can be used as an evaluation tool for educational and clinical experiences. In addition, they can be used to explore changes in subjects' self image, to develop critical thinking, and to help students to enhance their knowledge. Furthermore, they have been considered as a method that helps subjects to express their concerns and perceptions (Landeen et al., 1995).

Creswell (2009) considered journals as an example of documentation. According to him this form of documentation has many other advantages; the journals enable the investigator to recognise subjects' words and ways of expression, they can be accessed at a time suitable for the investigator, and they can save time, instead of spending it in writing transcripts. Moreover, data will show events that are significant for subjects. However, with documentation, not all people can express themselves in writing.

Reflective journals can be formal or informal. Formal journals are written according to what the researcher has asked to be mentioned. Therefore, the writer will mention only things that are important to the investigator, taking into consideration that his/her diary will be read by

another individual. An example of this approach is journals completed within health settings, such as medications intake journals. This form of journal is also used in the academic setting where students or teachers will reflect on their learning and teaching experience. The writer is taking two roles; he or she will be the informer and the observer (Jacelon & Imperio, 2005; Jones, 2000).

Informal journals are about daily activities, they reflect individuals' perceptions of a specific issue or many events. This kind of journal is personal and usually not to be shared with a second party; what are mentioned will be issues that are significant to the person who is writing the diary. It is used in historical research to discuss historical issues, and in a health setting to encourage patients to write about their illness experiences (Jacelon & Imperio, 2005; Jones, 2000).

3.2.2.3. Qualitative research rigour and validity

The debate and comparison between the positivist and interpretivist approaches have extended the ontological, epistemological, and methodological considerations. They were broadened to compare and contrast the qualitative and quantitative methods in terms of validity and reliability (Whittemore et al., 2001).

The use of terms such as 'validity' and 'rigour' with qualitative research was debated, because these terms are linked to positivism. It has been argued that both qualitative and quantitative methods advocate different philosophical assumptions and purposes; as a result each method requires different terminologies. Therefore, issues such as rigour and validity are 'empirical analytic terms that do not fit into an interpretive research that values insights and creativity' (Polit & Beck, 2008, p.536).

On the other hand, Burns and Grove (2003) argued that the criticism of qualitative research in terms of validity and rigour is because criteria utilised to evaluate quantitative research were also utilised for qualitative research. Moreover, they mentioned that, in qualitative research, rigour must be referred to in a different way, because the expected outcomes of this approach vary from that of quantitative research. In their opinion, in quantitative research rigour reflects 'narrowness, conciseness, and objectivity', and that leads to a strict adherence to the study design and use of precise analysis. However, in qualitative research, rigour reflects 'openness, strict adherence to a philosophical perspective, collecting detailed information, and consideration of all data in the subjective theory development phase' (Burns & Grove, 2003, p.391).

Lincoln and Guba (1985) established criteria to monitor the trustworthiness of qualitative studies. Trustworthiness in qualitative research means that 'processes of the research are carried out fairly, and that the products represent as closely as possible the experiences of the people who were studied' (Clayton & Thorne, 2000, p.1519-1520). Criteria have been established which aim to answer questions about the validity and reliability of the qualitative approach, and have been suggested to be the 'golden standard' for monitoring the quality of qualitative research. They are paralleling that of quantitative research (Polit & Beck, 2008; Seal, 1999). They include: credibility (equivalent to internal validity), dependability (equivalent to reliability), confirmability (equivalent to objectivity), and transferability (equivalent to external validity) (Guba & Lincoln, 1994; Lincoln & Guba, 1985). In 1994, Guba and Lincoln established an additional item, which was authenticity. The item was an outcome of continuous criticisms of qualitative research (Polit & Beck, 2008; Guba & Lincoln, 1994).

Credibility means confirming that data gathered from specific subjects are accurate and interpreted accurately as well. To achieve that, the study should be conducted in a way that allows for increasing 'believability' of results, demonstrating credibility to the external reader (Polit and Beck, 2008, p.539). Examples of methods used to achieve credibility are: triangulation (using multiple data sources, and different methods, investigators, and theories), negative case analysis which includes looking for divergent findings, and reviewing the data by another party to confirm the accuracy of interpretation (Mariano, 1995; Lincon & Guba, 1985).

Dependability refers to 'stability', in which the researcher will be able to establish the same result in a different time and with different circumstances. This means the same result will be obtained from comparable subjects situated within a comparable environment (Polit & Beck, 2008).

Confirmability means confirming that findings reflect information as given by subjects. Data will demonstrate subjects' perceptions, not constructed or biased by the researcher's imagination (Polit & Beck, 2008).

Authenticity means the researchers' ability to 'fairly and faithfully show a range of different realities' (Polit & Beck, 2008). This means that authenticity will be achieved when a research report can demonstrate specific phenomena as perceived and lived by subjects. The reader will become sensitive to problems being described by participants and become able to recognise their perceptions, experiences, and lived context (Polit & Beck, 2008).

Transferability refers to 'the extent to which the findings can be transferred to other settings or groups' (Polit & Hungler, 1999, p.717). Graneheim and Laundman (2004) said that researchers can provide suggestions about to what extent a study result is transferable to another setting; however, the final decision goes to the external reader. In addition, they argued that transferability can be enhanced through providing a clear explanation of the setting and its culture, the characteristics of the selected subjects, and the process of data collection and analysis. Moreover, a clear detailed presentation of the result with reference to the applicable quotes is necessary to promote transferability.

Tashakkori and Teddlie (1998) described many ways for establishing the trustworthiness of qualitative studies, including:

- Prolonged involvement of the researcher with the subjects.

- Continued observation to provide the researchers with the chance of gaining more 'depth', to know more details about the phenomena under study.

- Peer debriefing 'exposing oneself to a disinterested peer in a manner paralleling an analytic session and for the purpose of exploring aspects of the inquiry that might otherwise remain only implicit within the inquirer's mind' (Lincoln & Guba, 1985, p.308).

- Referential adequacy: 'storing raw qualitative data for later recall and re-analysis purposes' (Tashakkori & Teddlie, 1998, p.92). The re-analysis can be conducted by the initial investigator or by another colleague. Then, newly interpreted data might be compared with the previous data to enhance credibility.

- Keeping reflective journals during the research process.

Qualitative research validity has been referred to in many other terms, rather than trustworthiness; examples of other terms include 'truth value' and 'goodness'. However, these terms have not been accepted to the same degree as Lincoln and Guba's (1985) criteria (Whittmore et al., 2001). Whittemore et al. (2001) reconceptualised the validity criteria of qualitative research, through blending the work of Guba and Lincoln (1994, 1985) and another nine experts (Polit & Beck, 2008). Consequently, they came up with new criteria for assessing the validity of qualitative inquiry. They divided these into primary and secondary criteria. The primary criteria are considered as important for all qualitative studies, whereas the secondary criteria demonstrate standards of quality not applicable to all qualitative studies (Whittemore et al., 2001).

The primary criteria include credibility, authenticity, integrity, and criticality (Whittemore et al., 2001). It is obvious that the primary criteria include two of Guba and Lincoln's (1994, 1985) components of trustworthiness. Criticality means that the investigator critically appraises any decision taken during conducting the study. Integrity means persistent reflection and examination by the researcher to make sure that his/her interpretations are valid and reflect the data gathered (Polit & Beck, 2008).

The secondary criteria of validity established by Whittemore et al. (2001) include explicitness, vividness, creativity, thoroughness, congruence, and sensitivity. Explicitness is equivalent to 'audibility', and refers to 'the ability to follow the interpretive effort of the researcher' (p.531). The researcher requires careful and regular record keeping of data collected and his/her interpretations of it. Moreover, presenting the findings in a clear way will confirm and support implications concluded by the researcher (Whittemore et al., 2001).

Vividness means the ability to explain data faithfully with detailed and rich description. The researcher is able to demonstrate the skill of providing detailed explanations highlighting significant issues within data gathered (Polit & Beck, 2008).

Creativity means the researcher's flexibility and ability to adopt new ways of data collection, analysis, and interpretation (Polit & Beck, 2008; Whittemore et al., 2001).

Thoroughness refers to the degree to which the information collected is adequate due to appropriate selection of sample, approach used, and analysis; in addition to the comprehensiveness of the approach (Polit & Beck, 2008; Whittemore et al., 2001).

Congruence means the relationship between the research questions, methods, and findings; between the current study and previous studies; between the philosophy or theoretical framework and study findings (Polit & Beck, 2008; Whittemore et al., 2001).

Lastly, sensitivity means the study is conducted in a way which is sensitive and considerate to people's culture and social environment (Whittemore et al., 2001).

The development of validity and reliability criteria for qualitative studies is a result of the response to the criticism of qualitative research. The literature indicates that the validity criteria of quantitative research are not applicable to the quantitative approach. Lincoln and Guba's (1985) criteria of validity and reliability provide a clear explanation of how research trustworthiness can be achieved and are considered as the golden standard criteria. However, Whittemore et al. (2001) conceptualised criteria which appear comprehensive as they synthesised Guba and Lincoln's (1994, 1985) work with that of others.

Qualitative research rigour ensures openness, and collection of rich information. With it, researchers take into consideration the concept of validation during their planning and analysis stages. Data should be presented with a clear explanation of how they were validated and what techniques were used to achieve that. Honest and straightforward examinations, as well as looking for different descriptions and self-critical attitudes, are essential for qualitative research (Whittemore et al., 2001).

3.2.3. Mixed methods

Mixed methodology has gained popularity and is classified as a 'third approach' alongside quantitative and qualitative approaches. This strategy is considered as a unique approach which brings together qualitative and quantitative research, different from the traditional schools which focus on comparing, contrasting, and favouring one approach over the other (Bryman, 2006). The mixed methods approach demonstrates respect to both research paradigms (quantitative and qualitative) (Johnson et al., 2007).

The mixed method approach has been defined by Creswell (1994) as 'working back and forth between inductive and deductive models of thinking' (p.177-178). This definition reflects mixing the aspects of the qualitative and quantitative research paradigms together (Johnson et al., 2007). However, Tashakkori and Teddlie (1998) defined mixed method studies as 'studies that are a product of the pragmatism paradigm and that combine the qualitative and quantitative approaches within different phases of the research process' (p.19). In their opinion, the researcher might implement a particular design in one stage, such as experimental design, and follow it by a qualitative approach in another stage. Johnson and Onwuegbuzie (2004) provided a more comprehensive definition to mixed methodology, arguing that this approach 'includes the use of induction (or discovery of patterns), deduction

(testing of theories and hypotheses), and abduction (uncovering and relying on the best of a set of explanations) for understanding one's results' (p.17).

Quantitative approaches remain broadly used; however, various studies have started to employ quantitative and qualitative design together in a single study, to obtain fuller answers to their research questions (Silverman, 2010). The mixed method approach is recognised for its creativity and for being an extensive strategy, rather than being a limited way of researching. This approach is 'inclusive, pluralistic, and complementary' (Johnson & Onwuegbuzie, 2004, p.17). The researcher will utilise diverse ways to select the most appropriate method, and the research questions remain the main focus, since they direct the researcher into selecting the best and appropriate way for answering them. Investigators who will use mixed method design in their studies must be aware of the characteristics of the quantitative and qualitative methodologies, and the advantages and disadvantages of each approach. This will increase their capability of utilising these two approaches together (Johnson & Onwuegbuzie, 2004).

With mixed methods, the investigator can collect different data through adopting alternative strategies, which will result in a blend that brings together the strengths of the two different approaches. Then, the researcher can compare the result of one method with the other. Users of mixed methods search for agreement, evidence, and association between findings that emerged from different utilised approaches. If similar findings are incorporated across alternative approaches, the researchers' confidence in the accuracy of their findings will be increased (Denscombe, 2010; Johnson & Onwuegbuzie, 2004).

3.2.3.1. Mixed methods designs

Mixed methodologies come in different designs. The researcher's choice of a specific design is based on two factors. Firstly, how will the different methods be organised; which one will come first? Secondly, to which of the methods will the researcher give priority (Creswell, 2009)?

Conducting different methods in different orders will reflect what the investigator is thinking about, and in which form it is felt that the combined methods will demonstrate their best function. A researcher might start with conducting a quantitative design, and then follow it by a qualitative one or vice versa. In other conditions, it might be useful to conduct two different methods at the same time for the purposes of comparing findings from each approach with one another. Another form might be using qualitative and quantitative methods within multiple levels. In all cases, it is important that the researcher applies value to all utilised methods, and disregards the order in which they were implemented (Denscombe, 2010).

Creswell and Clark (2011) described different ways for blending qualitative and quantitative methods together and these will be explained below.

3.2.3.1. 1. The convergent parallel design

The researcher will conduct the quantitative and qualitative methods at the same time (e.g. distributing questionnaires and interviewing participants at the same time). The researcher will analyse data gathered by each method independently. This means each data set will be analysed with its own paradigm; quantitative analysis for quantitative data, and qualitative analysis for qualitative data. Both data sets will be integrated together after interpretation, to look for convergences and divergences across both sets of data.

3.2.3.1.2. The explanatory sequential design

Data collection will occur in different stages. The researcher will begin with collecting and analysing data gathered quantitatively, because the quantitative method addresses the primary questions of the study. After that, the second stage will follow with gathering and analysing qualitative data. With this design the researcher will use the qualitative data to give explanation to the quantitative findings.

3.2.3.1.3. The exploratory sequential design

The researcher gathers data on different occasions, similar to the explanatory sequential design. However, with this design the researcher will start with collecting and analysing qualitative data. After that, he/she will create a quantitative instrument with variables built on categories which have emerged from the qualitative data.

3.2.3.1.4. The embedded design

The researcher will gather and analyse both sets of data within one of the paradigms (either qualitative or quantitative). This means the researcher may add a qualitative item to a quantitative approach or the opposite.

3.2.3.1.5. The transformative design

The overall methodological choice is within a transformative theoretical framework. With this design the researcher can use any of the techniques used by the previously mentioned designs. However, with this approach the selected theoretical framework utilised might have a persistent effect on the whole process of the research (research aim, objectives, questions, subjects' selection, analysis, interpretation, and presentation of findings).

3.2.3.1.6. Multiphase design

This design is used in studies aimed to evaluate programmes, in which both qualitative and quantitative approaches are required for evaluating and improving certain programmes. For example, interviews may be conducted to explore participants' perceptions of certain issues. Then, the researcher will develop a measurement tool to examine differences in perceptions among subjects. After that, in a third stage, the researcher will design a programme according to information gathered from qualitative and qualitative designs.

3.2.3.2. Rigour in mixed methods research

The literature indicated that quantitative research has well recognised criteria for evaluation of validity and reliability. Moreover, assessing the quality of qualitative research by using the trustworthiness criteria established by Lincoln and Guba (1985) has become popular. This then focuses attention on mixed methodology studies, in regard of which evaluation criteria are useful for this approach (Bryman, 2006).

Sale and Brazil (2004) critically appraised a wide range of mixed methods studies to identify if any of them adopted evaluation criteria. They found that no mixed-methodology studies discussed any criteria for appraisal. Moreover, they reviewed a variety of evaluation criteria used to evaluate qualitative and quantitative studies. They suggested that some of these criteria could be used to appraise mixed methodology researches. Their proposed criteria for evaluating mixed methods were guided by Lincoln and Guba's (1985, 1986) trustworthiness criteria, and they rationalised their choice to 'the cross paradigm appeal' of Lincoln and Guba's framework (p.354). Moreover, they speculated that, although Lincoln and Guba's criteria presented the positivist and naturalist paradigms as being opposite each other, this framework brought the constructivist and interpretivist paradigms together under the

'naturalistic' umbrella. Their proposed appraisal criteria for mixed methods studies are as follows:

- Truth value: internal validity for quantitative methods versus credibility for qualitative methods;

- Applicability: external validity for quantitative methods versus transferability or fittingness for qualitative methods;

- Consistency: reliability for quantitative methods versus dependability for qualitative methods;

- Neutrality: objectivity for quantitative methods versus confirmability for qualitative methods.   (Sale & Brazil, 2004, p.354)

3.2.4. Conclusion

This section discussed methodologies including quantitative, qualitative, and mixed methods. Alternative kinds of each approach were highlighted. The issue of rigour in qualitative research was discussed in detail. The literature considered Lincoln and Guba's (1985) criteria as the golden standard for evaluating the validity of qualitative research. These criteria came in response to the criticism of qualitative methodology. Moreover the literature showed that Sale and Brazil (2004) used Lincoln and Guba's (1985) criteria to guide them in developing an appraisal strategy for mixed methods.

Mixed methodology is a third approach to conducting a research. It brings qualitative and quantitative research together in one study. In addition, it brings many advantages to research. It is complementary, flexible, and allows for answering a wide range of questions; with adopting the applicable method for each question. The next section will discuss the methodology of this study.

3.3. Methodology

3.3. 1. Introduction

This section will describe the methodology used in this study. The following aspects will be highlighted: study aims and questions, hypothesis, setting, participants, ethical considerations, the research design, justification of the selected methodology, and data collection methods and analysis. Then, a detailed description of the research process and stages of data collection will be provided.

3.3. 2. Study aims and questions

The study aimed to identify whether introducing Problem Based Learning (PBL) elements to a traditional teaching course affects students' critical thinking and performance, in addition to exploring students' perceptions towards the PBL elements and other traditional teaching methods. The participants were third-year female nursing students studying the Adult Medical Surgical Nursing II course over three months in one of the government universities in Saudi Arabia.

The following questions were addressed:

1. Is there any difference between students' dispositions towards critical thinking before and after introducing the PBL elements to their traditional course?

2. Is there any difference in students' academic performance before and after introducing the PBL elements to their traditional course?

3. Does introducing the PBL elements as an additional learning approach improve nursing students' critical thinking dispositions?

4. Is there a difference between the critical thinking dispositions of students who experienced the PBL elements and traditional education, compared to those who experienced only traditional education?

5. Do variables such as cultural background, age, and previous experience affect nursing students' dispositions towards critical thinking?

6. What are nursing students' perceptions of incorporating PBL elements in their traditional course over one semester?

3.3.3. Study hypotheses

1. There is a significant difference in students' critical thinking dispositions before and after implementing the PBL elements in their traditional course.

2. There is a significant improvement in the intervention group's critical thinking dispositions after implementing the PBL elements in their traditional course.

3. There is a significant improvement in the intervention group's examination grades after implementing the PBL elements in their traditional course.

4. Examination grades of the intervention group, who experienced the PBL elements and traditional education, are higher than those of the control group.

5. Students who are in the intervention group demonstrate significantly higher critical thinking dispositions than those who are in the control group after implementing the elements of PBL.

6. Age, previous experience, and cultural backgrounds affect students' dispositions towards critical thinking.

7. Students enjoy their experience with the PBL elements.

3.3.4. Setting

The study was conducted at King Abdul Aziz University Nursing College in Jeddah, Saudi Arabia. The King Abdul Aziz University nursing programme provides a Bachelor of Science in Nursing degree for its graduates. Details of the nursing programme at the King Abdul Aziz University are given in Chapter 1.

The reason for choosing this college as a place for conducting this research was that the King Abdul Aziz University nursing programme is a public programme. This programme produces large numbers of nurse graduates who work in various disciplines within Jeddah and other cities. The number of graduates sometimes exceeds 90 per year. This allows for the opportunity to generate a large sample size. Another important reason is that this college has a teaching style which can be referred to as very traditional. No active learning strategies have been adopted prior to this study. However, other colleges, such as King Saud University programmes in Jeddah and Riyadh, and King Faisal University nursing programme in Dammam city, have started adopting active learning strategies. This information was obtained through contacting these colleges when the researcher was trying to obtain approval for conducting her study.

3.3.5. Participants

Study participants were third-year nursing students ($N=68$) who were studying the Adult Medical Surgical Nursing II course over one semester. Based on the use of a t-test and ANOVA's to examine the difference between means, for a medium effect size at a power of 0.8 and p=0.05, a sample size of 64 per group was required. Initially the available sample size was said by the institution to be 120. However, the sample size obtained was much lower. Only 68 participants were available; therefore, to detect a difference between the groups with

the new sample size of 68 at the same power of 0.8 and p=0.05, a larger effect size was required. However, with a sample of 68 participants, a difference was found between the two groups indicating that the effect size was large and the sample size was sufficient.

The participants were chosen to be third-year nursing students because this is the researcher's area of interest. In addition, her background is critical care nursing and medical surgical nursing, which are taught in the third year. Moreover, the third and fourth year are considered to be the most important years of the nursing programme where students are more senior and have already learned all the fundamentals of nursing care in the previous two years. At this level, students developed a greater knowledge base than junior students who are in first and second years. They are more involved with serious diseases and conditions. In addition, they are more familiar with the clinical area. This facilitates the application of the PBL elements.

3.3. 6. Inclusion criteria
The criteria for inclusion in the study are that the participants are third-year nursing students who are studying medical surgical II and have been high school graduates or transferred from another nursing programme, and have agreed to participate.

3.3.7. Research design
3.3.7.1. Justification of selected method
This study applied a mixed method approach to answer the research questions. A quasi-experimental study was augmented by a qualitative approach encompassing reflective journals, group discussions, field notes, and data from observation of teaching sessions. The methodological approach in this study emphasises the application of the pragmatist paradigm, which is considered as a suitable theoretical framework for mixed methods. A mixed methods

approach has been used in this study because it provides many advantages to a study. It is complementary, creative, and allows for overcoming problems and weaknesses that could present in a single approach, such as bias (Johnson & Onwuegbuzie, 2004; Begley, 1996). It can be said that, with this approach, each method will compensate for any weakness of the other (Andrew & Halcomb, 2009). Furthermore, it will provide a chance to collect data which are more accurate, and which can be generalised to the wider population; in addition to increasing the chance of gaining a wider view of specific phenomena and rich information about the population who are under investigation (Parahoo, 2006; Pope & Mays, 1995).

According to Creswell and Clark (2011), mixed methods researchers should take into consideration certain issues. Firstly, the researcher should adhere to a specific design from the beginning of the study. Secondly, the design selected should be compatible with the problem under investigation and the research questions. Thirdly, it is necessary to provide at least a single reason for the decision to conduct a mixed method approach.

In this study the main aim of mixing methods is to answer the research questions: primarily, the quantitative questions, which are concerned with evaluating the effect on students' critical thinking disposition and academic performance of introducing PBL elements in a traditional course; secondly, the qualitative question, which aims to explore students' perceptions of their experience with introducing PBL elements to their course.

Based on Creswell and Clark's (2011) classifications of mixed methods designs, this study adopted the explanatory sequential mixed method design. This kind of mixed method design has many advantages: it is a straightforward approach, it provides a chance for detailed explanation of quantitative findings, and it is beneficial when the quantitative method

generates unexpected findings (Ivankova et al., 2006). In this study, quantitative data were collected in two stages (pre-test and post-test), using the CCTDI. Then, qualitative data were gathered (end-of-semester reflective journals) to explain the quantitative results. However, other qualitative data resources were used, which are: within-semester reflective journals collected during the course, field notes, group discussion, and observation of teaching sessions to provide more depth and richness to the data collected.

The main aim of using multiple methods in this research was to explain quantitative findings, and to allow for further understanding of unclear information. Qualitative data will help to explain the quantitative results and provide answers to questions that might be raised. In addition, the researcher will identify whether data from different approaches support or contradict each other. Consequently, the researcher would have a more explicit view about the environment where the research was conducted.

The data were gathered in the following order:

- Gathering quantitative data, before starting introducing the PBL elements to the course.

- Gathering within-semester reflective journals during the implementation of the PBL elements to the course.

- Gathering quantitative data after the completion of the course.

- Gathering end-of-semester reflective journals.

Group discussion and field notes were also gathered during the implementation of the PBL elements to the course, in addition to observation of teaching sessions. Though not

specifically planned, this information is important as an additional source of information. It should provide more richness and depth.

Diagram 3.1 will demonstrate the stages of gathering data in this research. In addition, the research process section will describe in detail the stages of data gathering and rationale for the used data collection methods.

Diagram 3.1: Stages of data collection

Gathering quantitative data (pre-test)

Within-semester reflective journals

Group discussion

Implementing the PBL elements and gathering qualitative data

Field notes

Observation of teaching sessions

Gathering quantitative data (post-test)

Gathering qualitative data (end-of-semester reflective journals)
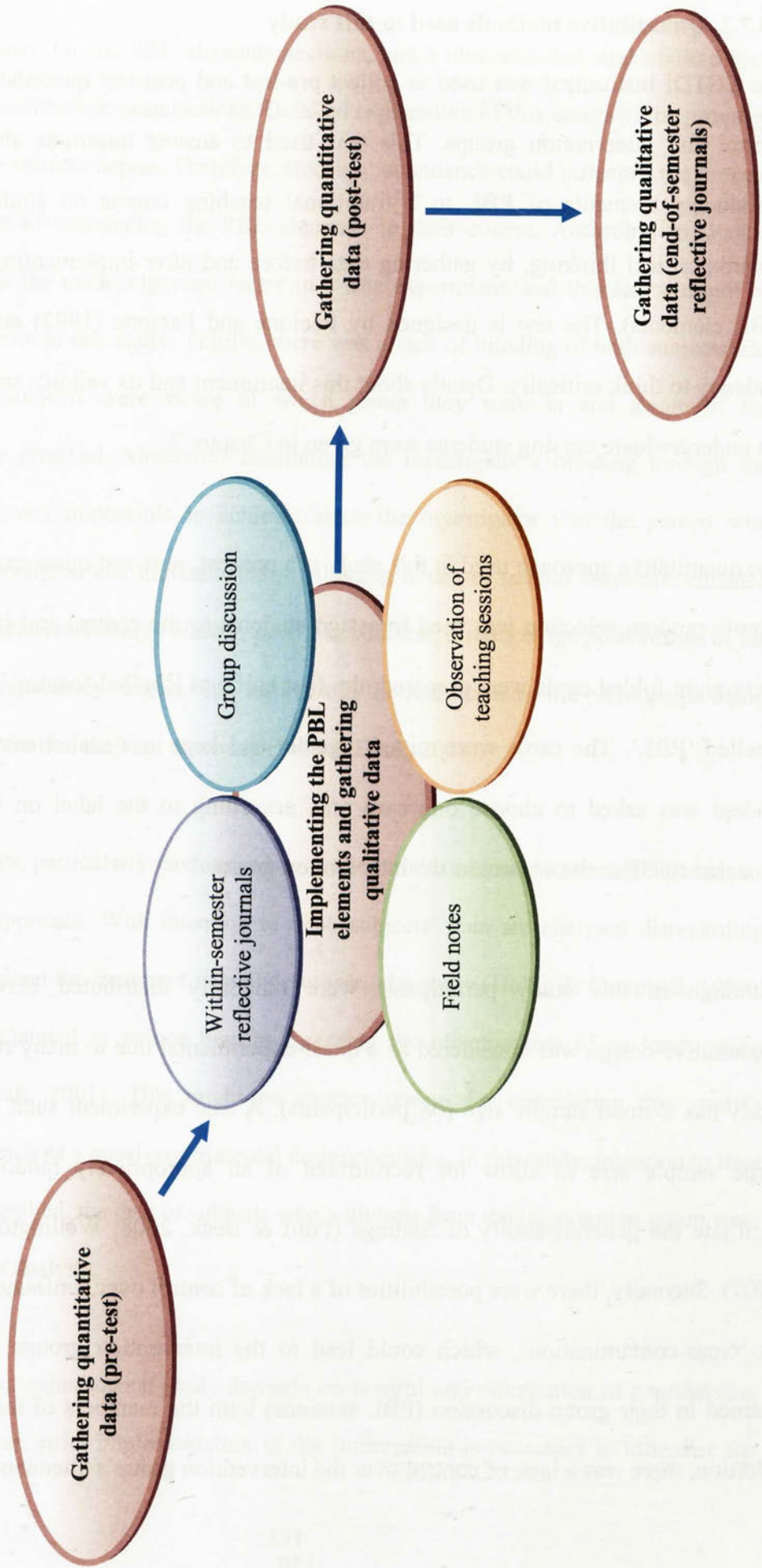
3.3.7.2. Quantitative methods used in this study

The CCTDI instrument was used to collect pre-test and post-test quantitative data from the control and intervention groups. This was used to answer questions about the effect of introducing elements of PBL to a traditional teaching course on students' dispositions towards critical thinking, by gathering data before and after implementing the intervention (PBL elements). The test is designed by Facione and Facione (1992) and it monitors the tendency to think critically. Details about this instrument and its validity and applicability for the undergraduate nursing students were given in Chapter 2.

The quantitative approach used in this study is a pre-test, post-test quasi-experimental design. Simple random selection was used to assign students to the control and intervention group. Sixty-eight folded cards were prepared; the first half was labelled 'control' and the other half labelled 'PBL'. The cards were mixed together and kept in a sealed envelope. Then, each student was asked to choose one card and, according to the label on the card, she was allocated to either the control or the intervention group.

Although in this study participants were randomly distributed between groups, the quantitative design was considered as a quasi-experimental due to many reasons. Firstly, the study has a small sample size (68 participants). A true experiment such as RCT requires a large sample size to allow for recruitment of an appropriately randomised group, and facilitate the generalisability of findings (Polit & Beck, 2008; Wellington & Szczerbinski, 2007). Secondly, there were possibilities of a lack of control over confounding variables such as 'cross-contamination', which could lead to the intervention groups sharing what they learned in their group discussion (PBL sessions) with the members of the control group. In addition, there was a lack of control over the intervention group's attendance. I was recording

students' attendance for the PBL elements sessions, and I observed that students had high rates of absenteeism before examinations. Detailed explanation of this issue will be provided in the qualitative results chapter. Therefore, students' attendance could influence the process and the outcome of introducing the PBL elements to their course. According to Walker (2005), control is the main important factor in a true experiment, and this factor might be difficult to facilitate in this study. Thirdly, there was a lack of blinding of both subjects and the researcher. Subjects were aware of which group they were in and aware of the intervention they received. Moreover, facilitating the investigator's blinding through the research process was impossible to achieve, since the investigator was the person who prepared the intervention and implemented it. Blinding is one of several ways that enhance control in an experimental study (Walker, 2005). In addition, it reduces the possibilities of the 'awareness' or 'expectancy' biases, that result from the researcher or the participants being aware of the intervention they are receiving (Polit & Beck, 2008).

In true experiments, particularly randomised controlled trials, intention to treat (ITT) analysis is an important approach. With intention to treat, subjects' data are analysed disregarding whether they received the treatment or withdrew from the study (Hollis & Campbell, 1999). This strategy is claimed to reduce bias in assessing the effectiveness of an intervention (Montori & Guyatt, 2001). This might be another reason for considering this study's quantitative approach as a quasi-experimental design; because, in this study, intention to treat analysis was not applied, the data of subjects who withdrew from the intervention group were not included in the analysis.

In summary, a true experimental study depends on control and elimination of confounding variables. Moreover, strict implementation of the intervention is necessary to minimise the

occurrence of bias (Walker, 2005). In this study, it might be difficult to facilitate these requirements. Therefore, a quasi-experimental design is a better description than true experimental design, as a result of the following: there is a risk of possibility of cross-contamination, there is a lack of strict application of the intervention due to lack of control on students' attendance, and there is a risk of bias due to lack of the researcher's and subjects' blinding.

However, in this study, to reduce the effect of non-blinding on the research result, the investigator is not responsible for preparing any examination or evaluation materials or even evaluating students. This was totally the responsibility of the other teachers. Moreover, to reduce the possibility of the occurrence of cross-contamination, the intervention group was asked to provide assurance that they would not share the materials they receive with the control group.

The literature suggests the use of cluster randomisation to overcome the risk of contamination. With cluster trials, groups are randomly allocated to the control and intervention groups, instead of individuals' randomisation (Puffer et al., 2005). However, this kind of randomisation was not possible in this study. According to Puffer et al. (2005), with cluster randomisation, achieving statistically significant results similar to those for individual randomisation requires an increased sample size. An appropriate cluster trial requires a sample size 50% to 100% greater than the original sample size for individual randomisation, with at least five clusters per group. Therefore, since this study sample was small, it was impossible to follow this approach to randomisation. Cluster randomisation can be facilitated by recruiting more subjects through accessing other institutions. However, this would have exceeded available resources and the researcher's target was a specific group with specific

characteristics. In addition, cluster randomisation has some limitations, such as the possibility

of 'recruitment bias' and inability to monitor subjects individually (Torgerson, 2001).

3.3.7.3. Qualitative methods used in this study

The qualitative approach has two aims: the first aim is to provide further explanation to the

quantitative findings; the second aim is to identify students' perceptions of their experience

with the implementation of the PBL elements to their course, and their experience of other

traditional teaching methods. To reach these aims, students were encouraged to reflect on

their experiences using reflective journals. However, additional qualitative data were

collected from group discussions, field notes and observation of teaching classes. Additional

qualitative data were not planned for. But, it was found that they include important data,

which provide further insight and richness. Group discussions were held, usually after the

completion of the sessions, where students openly discussed issues regarding their education.

The discussion was not structured and not guided by any questions. Observation notes were

obtained from observing teaching sessions, and field notes obtained through visits to clinical

settings where the students do their training.

Students' reflections were gathered in two stages: the first stage was named the 'during-trial

period' and the second stage was named the 'after-trial period'. Sandelowski's (1996)

framework of classifying qualitative data in experimental studies was followed. It provided

three stages for collecting qualitative data in experimental studies, which are: before the trial

starts, within the trial, and after the trail was completed. Creswell et al. (2006) provided a

practical explanation for gathering qualitative data in experimental studies, based on

Sandelowski's (1996) classification:

- Before-trial design: the researcher will collect data and analyse them before starting the intervention. The main purpose of this is to improve the quality of the experiment.

- During-trial design: where the researcher will collect qualitative data during the intervention. This will increase the validity of the quantitative results. In addition, it will allow the investigator to understand the effect of the intervention on subjects, as well as highlighting participants' perceptions and experiences during the intervention phase. Furthermore, it will highlight factors that could affect the outcome, such as cultural differences and age.

- After-trial design: this includes collecting data after the experiment is completed. The investigator will collect data about subjects' opinions about the intervention and whether any changes or modifications are required. Besides, collecting qualitative data after the trial has been completed will help in interpreting the quantitative results.

Using qualitative methods with trials can allow researchers to assess the appropriateness of and pressure that might be applied to subjects by a specific intervention. In addition, it can provide a chance to develop a broader view about the effect of the intervention on subjects and it gives a chance to understand the reasons that lead to either accepting or not accepting the intervention by subjects. Moreover, the researchers can examine people's differences in response to the intervention within different circumstances (Sandelowski, 1996).

The aim of incorporating qualitative methods with experimental studies differs from one stage to another; whether it has been collected before, within, or after the trial (Andrew & Halcomb, 2009). Therefore, in this study, journals were collected in two stages: the first stage aimed to encourage students to reflect on their experience with integrating the PBL elements in their course; what they learned from it, what they liked or disliked about it and if they had

any suggestions with regard to it. On the other hand, the second stage aimed to encourage students to reflect on their overall experience through the semester with implementing the PBL elements and their experience of other ways of teaching, specifically traditional ways of teaching. Students were asked to reflect on their experiences freely, and responses were anonymous. Most of students preferred to use their first language – Arabic – to complete the form.

In this research, the within-semester reflective journals were structured, where specific questions were asked to students. However, the end-of-semester reflective journals were open and unstructured, to allow students to reflect on their experiences about the PBL elements and other traditional teaching methods in more detail. Brown and Sorrell (1993) suggested using a specific format for writing reflective journals. They supported the concept of using criteria to guide students in writing their reflections, instead of using a free design reflection. As a result, the aim of reflective journals can be achieved. In this research the within-semester reflective journal consisted of the following questions and the following structure:

1. Describe the session of this week.

- What happened?

- What did you do?

2. What did you learn from this session, and how did you learn it?

3. How do you feel about this session?

- Were any difficulties experienced?

- How did you dealt with it?

4. How do you evaluate the PBL session?

- Advantages.

- Disadvantages.

- What would you like to change? Is there a new thing you want to suggest?

These questions were designed to help students structure their feedback in a uniform way. Moreover, they helped them to provide pertinent information rather than mentioning irrelevant material. Reflective journal questions were adopted from the work of Patton et al. (1997) and Simpson (2002). In addition, instructions available online about how to write reflective journals, prepared by the Royal College of Speech and Language Therapists, were used.

Reflection is defined as

'Intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations' (Boud et al., 1985, p.19).

Reflecting on a specific experience will help learners to make sense of what they have learned and it is considered an essential part of the learning process (Boyd, 2002). According to Simpson and Courtney (2007), reflective journals will help to enhance the questioning habit and will result in creating what is referred to as an 'inquiring mind', which will contribute to improving students' critical thinking skills. Therefore, using reflective journals in my research after the PBL sessions allowed students to reflect on their experiences with the sessions. This achieved the first aim of journaling, which is exploring students' perceptions, opinions and experiences. Besides, stating the outcome of their experience with PBL fostered their critical thinking.

Students' reflective journals are considered an important source of qualitative information. They are able to provide data, which are not possible to gather from other resources (Kaur, 2003). In addition, they may support the findings of instruments such as questionnaires. Journals have previously been used to evaluate the effect of courses and programmes. They allow participants to express their feelings freely, which is not the case with the usual course evaluation tools (Phelps, 2005; Kaur, 2003).

3.3. 8. Ethical issues

Approval was sought from the University of Sheffield Ethics Committee and from the nursing school where this research was conducted. Participants' agreement was obtained through informed consent. They were assured that their participation was voluntary and they could withdraw from the study at any time. Students that withdrew from the intervention group joined the control group, where the standard methods of teaching were used only. In addition, they were excluded from the research and their data were not included in the analysis. Participants were assured that data collected would be anonymous and confidential. Besides, all documents were held securely in a locked office provided by the head of the school.

In this study, blindness was impossible at this study due to the investigator being the facilitator of the sessions, which allowed her to know the members of each group. In addition, the control and intervention group were not receiving the same quality of teaching and the same amount of materials, since additional material was added to the intervention group, which was the implementation of the PBL elements strategy. This could affect subjects' grades and performances. As a result, the strategy adopted in the study allowed both groups to attend lecturing classes; with the PBL approach added to the intervention group. Besides,

all teaching and evaluation materials were prepared by teachers, not the researcher, and both groups were subjected to the same examinations. In addition, to avoid any bias, the teachers did not know which students were in the intervention group and the control group.

It was expected that students in both groups would exchange their educational materials and discuss what they had gained from the educational sessions; this can be referred to as 'cross-contamination' (Yuan et al., 2008a). However, the intervention group students' reflective journals would be analysed to reduce the effect of this kind of bias.

3.3.9. Data analysis

3.3.9.1. Quantitative data analysis

Quantitative data were analysed using Statistical Package for Social Sciences (SPSS) version 16. Descriptive statistics were used to analyse each group's demographical data and pre-test and post-test total CCTDI scores. Statistical tests were chosen based on the study aims and measurements required. Inferential statistics were used. Dependant sample t-tests were performed to identify differences in each group's pre-test and post-test results. Similarly, independent sample t-tests were also adopted to highlight differences between groups. A one-way ANOVA test was used to identify any relationship between demographics and the CCTDI, GPAs and examination grades. In addition, post-hoc tests were performed. Finally, the Pearson correlation was use to highlight relationships between critical thinking abilities and examination grades and GPAs.

3.3.9.2. Qualitative data analysis

Polit and Hungler (1993) argued that the aim of qualitative data analysis is to organise extensive data that gathered. Furthermore, it helps the researcher to extract important

information from original data (Clayton & Thorne, 2000). In this study, the 'Framework' method described by Ritchie and Spencer (1994) was used to analyse data illustrated from the journals. This method was introduced by the Social and Community Planning Research Institute (SCPR), and considered to be a flexible way of analysis. With 'Framework' analysis, the researcher can proceed with working on themes emerging, and applying these to the entire data set. The main advantage of this approach is that there is a clear and precise technique and structure, coupled with transparency and the ability to retrieve data. 'Framework' analysis involves familiarisation, sifting and sorting, and indexing to help in identify important and recurrent themes. This stage indicates that the researcher has reached the thematic framework which is then applied to the data set. Framework is said to be both comprehensive and systematic in its approach to qualitative data analysis (Ritchie & Spencer, 1994). In this study framework analysis was used to analyse data gathered from students' within-semester and end-of-semester reflective journals, as well as other additional qualitative data gathered from observation of teaching sessions, group discussions, and field notes.

Stages of analysing the qualitative data were as follows:

1. Reflective journals were numbered with each case being referred to by a code. For example, a transcript of case one from the within-semester reflective journals was referred to as 'RJl/casel', and case one from the end-of-semester reflective journals was referred to as 'End of semester RJl/casel'.

2. Reflective journals written in Arabic were translated into English. In addition, those written in English were reviewed and re-written to keep the adequacy of the writing style and to avoid any grammatical errors. All journals were written in a Word document.

3. Notes from group discussion, observation of classes, and field notes were transcribed into a Word document.

4. The translated journals were reviewed by a second party who had experience of translating transcripts from Arabic into English, to ensure that the Arabic reflective journals were properly translated without causing a change in their meaning. The second party compared the translated reflective journal with original ones written by participants.

5. Each line was given a number to help in analysis to ease the process of finding quotes.

6. Familiarisation:

- All gathered material transcripts (reflective journals, observation of teaching classes, group discussions, and field notes) were read more than once.

- Recurrent key issues and statements were highlighted.

- Themes were identified and recurrent themes were given a title (subtheme).

7. Devising and refining thematic framework:

- Some of the subthemes discussed the same information but discussed it in different places. Therefore, similar data were gathered together and discussed under the same subtheme. This lead to some of the subthemes being considered as major themes because the data discussed under those subthemes were important and recurrent in more than one area. For example, 'evaluation methods' were discussed under both the traditional teaching approach and reflections on clinical practice. Therefore, it was decided to make evaluation methods a major theme and then include whatever was discussed about that in either clinical practice or teaching under this new title. It was observed that some of the headings were similar.

8. Indexing: a textual system was used for that, in which a short descriptive text mainly using previously identified subthemes was written in the margin, next to the

appropriate text within the data (i.e. in the transcripts of reflective journals, group discussion, field notes, and observations).

9. Charting: thematic charts were developed:

- Each chart consisting of rows and columns. Columns were for themes and subthemes derived from previous steps, and rows for respondents in which every single respondent was placed in a single row.

- Data indexed in the indexing stage were transferred to charts, where a summary of data from the reflective journal was placed in the appropriate subtheme column, next to the appropriate respondent. This allowed for easy retrieval of the data according to the core theme and the respondent who provided them.

10. Journals were reviewed to ensure that no data were missed.

11. Mapping and interpretation:

- Data were interpreted, important concepts were defined, participants' perceptions and reflections were explored and explained. In addition, relationships between students' feelings and the nature of the context that they described were identified.

- It was ensured that data interpretations truly reflected the participants' views and perceptions as they described them.

3.3.10. Different methods integration

Integration is referred to as combining things together. In research, integration means specific relationships among methods, findings, analytic methods, and theoretical perspective (Moran-Ellis et al., 2006, p.50). With mixed methods, data will be integrated together to reach a specific goal, which is 'knowing more'. Integrating data of different research methods with keeping the unique characteristics of each set of data is challenging. A useful way might be to

analyse each form of data separately within its own paradigm and take into consideration more significant research questions (Moran-Ellis et al., 2006).

Moran-Ellis et al. (2006) established an integration method, which is referred to as 'following a thread'. With this form of integration, each various data item collected from a different method will be analysed separately, ensuring that each set of data has been analysed with its own paradigm. The main aim of that is to highlight significant themes and research questions that need more investigation. With the 'following a thread' technique, a theme or a question will be selected from one of the datasets and explored across the other, in the light of initial research questions and literature.

Moran-Ellis et al. (2006) described another way of integration which is almost similar to the 'following a thread' technique. However, with this approach the researcher will be advantaged from differences and tensions between various data. Another way of integrating qualitative and quantitative data analysis was introduced by Bazeley (1999). With this technique, text derived from qualitative data will be coded in numbers. Then, codes will be transferred into a spreadsheet or statistical software such as SPSS to form quantitative data. Both quantitative and qualitative data will be in the same file. Bazeley (1999) considered this way of bringing together qualitative and quantitative data as a chance to identify a new variable which might require further investigation.

In this study the 'following a thread' technique, developed by Moran-Ellis et al. (2006) was used. The quantitative data were explored in the light of the qualitative data. In addition, whether findings from the two approaches support and explain each other were examined. This approach was chosen because it was claimed to allow integration of qualitative and

quantitative data whilst keeping the original characteristics of each one. The 'following a thread' technique retains the specificity and focus of quantitative findings and the exploratory characteristics of qualitative findings (Moran-Ellis et al., 2006).

3.3.11. The research process

3.3.11.1. Piloting

In this study, piloting aimed to determine the applicability of the CCTDI questionnaire to the study participants. It was expected that this would help determine whether the subjects would find any difficulties with understanding the statements in the instrument and in completing the test. The instrument was piloted in December 2009, three months prior to the actual research. Third-year nursing students from another college situated in Jeddah city were recruited to participate in the pilot study. Participants had the same characteristics of the actual study subjects in terms of age, gender, the year of the program, and courses studied. The approximate time of completing the questionnaire was 45 minutes. There were no difficulties or problems with completing the questionnaire and students found it to be very clear. No suggestions were added. However, a few students asked to clarify certain words mentioned in the statements. Therefore, it was found to be necessary to have the Arabic version to hand, to use it only for explaining the terms that students find difficult to understand while they were completing the original English version. Therefore, one copy of the Arabic version was ordered from the company.

3.3.11.2. Stage I: Research environment identification, participants' recruitment, and allocation

The research was facilitated in the first semester of the academic year 2008/2009. The school administration was contacted regarding conducting the study within the school. The aim of

the study was described and it was explained why this program was chosen. Reasons were described clearly, including the possibility of accessing a larger group of participants than other nursing colleges, and because this program only uses a traditional teaching style with no involvement of any kind of active learning strategy. This will allow for better monitoring of incorporating any new learning approach such as the introduction of the PBL elements. The head of school showed her interest and support. After that, the ethical approval process was followed and permission obtained in December 2009.

After permission was obtained from the School of Nursing, a meeting was held with the course teachers. They were informed briefly about the research, its aims and objectives, and contact was made with the students who would be prospective participants. Participants showed their interest and agreed to participate. Students were informed that they would be separated into two groups randomly and they could be in either of the groups. They did not appear to have any problem with that. After that, the students' consents to participation were collected. Each participant's agreement was obtained through signing an informed consent form. The consent form was accompanied by an information sheet explaining the study aim and the participants' role.

In the first week of the second semester (28 February 2009), randomisation and the intervention group orientation were performed. A simple randomisation method as described earlier was followed. After randomisation, students in the intervention group were informed about what was expected from them, and a presentation about the PBL elements and how to do reflective journals was given to them.

3.3.11.3. Stage II

Within the first week of the second semester and before commencing the research intervention, a pre-test was introduced to both groups separately using the CCTDI. A form including questions about participants' demographic data was also attached to the test. On this form students were asked to give information about their age, GPA, previous experience of PBL or active learning, and whether they had been transferred from a nursing programme such as an associate degree or they were high school graduates. The reason for including this information is that age, previous nursing experience, being transferred from another programme and maturity has been found to affect critical thinking abilities significantly (Lederer, 2007; Suliman, 2006; Vaughan-Wrobel et al., 1997).

After the pre-test was completed, students were oriented about the programme. Detailed information about the process was given, students were encouraged to ask questions and they were informed about what was expected from them. Most of the students were worried about the reflective journal since they had never used one or knew about it. They were assured that they would have questions to help them complete the journals.

3.3.11.4. Stage III

The third stage of data collection was the experimental stage. Based on this, the control and intervention groups were to be compared. Although students were in two groups, course content was similar for both. The only difference was adding the intervention of the PBL elements to the intervention group. Both groups were receiving the same lectures and same clinical training. However, the intervention group received additional sessions implementing the elements of PBL. The main aim of adding the additional sessions of PBL elements was to

evaluate the effect of that on students' critical thinking disposition and academic performance, and to identify if that will lead to differences between the groups.

Sessions where the PBL elements were applied were conducted three times a week: they were given in the afternoon every Saturday, Monday, and Wednesday and their length was one hour. The control group students received only lectures. Lectures were given in the afternoon after returning from the clinical training, which was usually four days per week from 8 am until 12 pm. Then, students returned to the college, took a one hour break and started their classes again from 1:30 pm until 3 pm. The teacher was usually the only source of information. Students sat in a standard class where chairs are organised in rows. The teacher gave her lectures through using the overhead projector and PowerPoint presentations. Students had limited participation in their learning process; they only listened to what the lecturer was saying and took notes. They could ask her questions if they needed verification. Students were given handouts summarising what had been discussed in lectures, and they used the text books which were recommended by the teacher. Students' were evaluated by their performance in written examinations, presentations, and written care plans.

For the intervention group, students attended the previously-mentioned lectures with the control group, as well as attending the sessions where the PBL elements where introduced. Sessions were conducted from 3 pm until 4 pm every Saturday, Monday and Wednesday and the researcher was the facilitator. The sessions were added to the Medical Surgical Nursing II course, which was taught to third-year nursing students. The course topics are stated in Appendix Six.

3.3.12. The intervention: Problem Based Learning (PBL) elements

It might be worth describing why the intervention was referred to as 'PBL elements' instead of 'PBL'. Referring to the previous discussion in the literature review, Gwendie (1996) argued that a PBL program will not be seen as a 'pure PBL' if the traditional teaching methods such as lectures still have the initial focus, if PBL was included with the traditional techniques, and if the assessment of students' performances relies on memorisation. In this study, all these factors presented. The PBL elements were integrated with the traditional course (standard lectures), which has the major part and primary focus. In addition, standard assessment methods followed in the college rely more on memorisation. Information about assessment methods will be discussed in the qualitative results chapter. Another factor is that the intervention is this study relies greatly on case scenarios which are considered as playing the main role. Therefore, it might be argued that the presentation of the above-mentioned factors in this study provides a strong reason for considering the additional PBL elements as being PBL which is incompletely implemented and therefore not to be considered as 'pure PBL'.

PBL elements consist of the use of case scenarios, care plans, and self-directed learning. However, case scenarios have the major role and they are the main source of learning, since the sessions aim to discuss problems presented in the scenarios and formulate solutions for them. In addition, subsequent PBL elements were built on these scenarios (i.e. care planning and self-directed learning). Case scenarios were prepared based on the Adult Medical Surgical Nursing II course syllabus, which was provided by the course director. Each scenario was designed to complement the course topic of the week; for example, if the teacher was going to give a lecture about the respiratory system, the scenario should be

around the same topic. The researcher used the same books used by the college to help her in preparing the needed materials.

The PBL elements utilised in this study, and the process of implementation was formulated based on the literature review; what PBL is, how it should be constructed, and what should be considered while preparing such a programme have all been discussed earlier (Yuan et al., 2008a; Johnson & Mighten, 2005; Caputi & Engelmann, 2004; Maudsley & Strivens, 2000; Price & Price, 2000).

3.3.12.1. Case scenarios:

The main objective of case scenarios was to help students to identify important information, objectives, and any gaps presented in the information given. Students would learn new information; share it with the rest of the intervention group and reflect on their experiences. Students would also analyse each other's opinions (Lee et al., 2004). Case scenarios have another important objective, which is helping students to learn how to prioritise their interventions.

At the stage of preparing the case scenarios, help was sought from Professor Karen Holland, who is a research fellow (Evidence-Based Nurse Education Innovation) in the School of Nursing at the University of Salford and Editor of the Nurse Education in Practice journal. The researcher met her at the Nurse Education conference in Ireland in June 2008 and this research was discussed; she was very interested since her area of interest was evidence-based nurse education. The researcher had a meeting with her in December 2009 and how the scenarios should be prepared was discussed. The researcher showed her some examples of prepared work, and her feedback and suggestions were very helpful in structuring the

scenarios. The researcher was able to structure them in a way that the health problems presented developed from level to level; that would provide students with a chance to think and try to find out how they would control worsened or aggravated problems. Examples of scenarios will be given in the appendix Seven. Moreover, the researcher attended a workshop at her school about PBL that was very helpful, especially in learning how to guide students during working on scenarios through using 'trigger guide'. Information about the structure of the trigger guide used in this study will be given below.

The researcher reviewed the topics that would be taught by the teachers every week and other problems in the clinical area; then, based on that, the case scenarios were developed. The number of case scenarios was expected to be 12 cases; each case to be worked on over one week. However, their number was reduced to six instead of twelve. The plan at the beginning was to discuss one body system in one scenario, but the researcher found this to make scenarios very shallow and simple, which would not help the researcher to reach the study aim, which was to increase students' thinking abilities, helping them to search between the lines, be systematic, and manage more than one problem at a time. Therefore, one scenario discussed more than one body system and problem. As a result, working in one scenario lasted for more than a week (three to five one-hour sessions). The six scenarios were covered in thirteen weeks. The whole semester was 18 weeks. The first week was for registration; within the second week students were only oriented to the PBL elements and they completed the pre-test questionnaire. The other three weeks were for mid-term examinations and the final examination.

Students were divided into three groups, two groups consisted of eleven students and one group had twelve students. Discussion groups of 10 or 11 students were previously followed

by Yuan et al. (2008a) and Tiwari et al. (2006a), and there were no problems with that size of group. At the beginning of the week, immediately after the lecture was finished, the facilitator distributed a learning package to each member of the intervention group. The learning package consisted of: the case scenario of the week, which was related to the topic discussed in the lecture, learning objectives related to the topic of the week, and the scenario trigger guide which consists of questions to help students to solve the problem presented in the scenario. In addition to a reflective journal, a form was completed at the end of the week after finishing with the scenario.

Case scenarios were usually in the form of problems happening to patients within the emergency area or other units within the hospital. The trigger guide form contained questions prepared earlier by Papastrat and Wallace (2003). This was suggested to help students to solve the problem within scenarios. The questions were:

1. **What is known about the problem?**

- From the case scenario?

- From your previous knowledge?

- From nursing knowledge?

2. **What do you need to know?**

- What are the knowledge gaps?

- What information needs to be further researched?

- What do you need to know?

3. **Prioritise the knowledge gaps.**

- What information is most significant?

- What information is most useful to the group?

4. Hypothesise the problem.

- What does it all mean together – what was the problem?

- Identify knowledge gaps.

- Summarise your findings and their significance.

- Describe your recommendations.

- Develop a plan to address the problem.

The group work usually started immediately after the lecture. Each group was in a separate classroom, and the facilitator made rounds between the three groups. After distributing the learning package, each group spent 15 minutes in reading the scenario. Then, they started to summarise on the trigger guide form what is going on. Students were required to discuss the problem in the scenario with the rest of their group; then to write down terms and concepts which were required to be identified. They were expected to state their objectives, the types of problem the patient had, and then try to manage the problem systematically with priorities.

They were expected in the first part of the session to do what is termed as 'brainstorming' (Yuan et al., 2008a). Students were motivated to use their previous knowledge obtained from other modules studied earlier to verify the problem and identify possible explanations for the signs and symptoms and the whole situation. This let them know what knowledge they had and what they needed to look for. The facilitator made rounds between the three groups to observe how the group work was proceeding.

Each group had a team leader and a scribe. The team leader was responsible for distributing the tasks between the team members and ensured that everyone was engaged in the discussion. The scribe role was to write down what had been discussed and agreed on in

terms of management and solutions. In addition, she wrote down any unclear terms, concepts, and any other matter requiring to be searched for and discussed. The latter part made the content of presentations, which were aimed at helping students to understand the pathophysiology of the presented problems, and the required treatment and managements. Those two roles were rotated between the group's members; this provided an equal chance for every person to be a scribe or a team leader.

At the end of the first session, once students figured out what the problem was, the leader disturbed the work between her team. This usually happened in the first session but sometimes it was postponed to the next session due to time constraints. In the next session, students usually completed working on managing the problem of the scenario. Once each group agreed on the solution, the team leader nominated one person who would stand up and discuss the findings and solutions with the other two groups. As mentioned earlier, one of the students' responsibilities was to discuss the pathophysiology, treatment of the problem, and explain any unclear concepts or terms. The group chose three or four members to prepare a 15-minute presentation around that. At the second or third session, once the problem solution was agreed on and the presentation was prepared, the three groups gathered together. The third session started with discussing the problem, what it was and the proposed solutions. Groups had to show their abilities at applying solutions and management by priority. If one group gave wrong information or management, other groups had the right to correct them.

Regarding the presentation, each group leader nominated a member who would present. The facilitator usually managed the presentation in order to make sure that each group discussed at least a section of their presentation. Then, the scribe gathered the trigger guide forms after they had been discussed and corrected; based on that, she wrote a document about the agreed

findings, treatments and solutions. She gave the document to the facilitator who reviewed it and then distributed a copy to each member. Sometimes the facilitator took the responsibility of writing the problem solutions and management since students were busy with other assignments. The expected solution to the problem was based on what was taught by teachers and what was found in the literature. Therefore, the researcher spent a long time reading around the topics and summarising the required management and solutions.

Students took the scenario with them to the hospital in the morning and asked their instructors to help them with solving it. Sometimes by chance they experienced a similar case in the intensive care unit with the same diagnosis and clinical presentation that was mentioned in the scenario. This made them very interested, and what was observed was that they wrote down all the information about the case, including managements and treatments given.

For solving the scenario problems and preparing the presentations, students were encouraged to use their textbook and online searching. Some of the students brought their laptops with them; this gave the facilitator the chance to show the students how to use the internet to find the relevant information. Earlier, there was a plan to use the library facilities in the college but that was very complicated. Students could not go alone to the library; one of the teachers or the facilitators had to go with them and also there was little time for that. Students' timetables were full from 8 am until 4 pm. Therefore, using text books and online search within the classrooms via students' laptops were easier and more convenient. The facilitator's role during the sessions was only to motivate students to think of possible solutions and try to discuss them with each other through questioning.

At the beginning of the semester, it was expected to work on 10 or 12 scenarios within the whole semester. That means each scenario would take about a week to finish. However, it was found that each scenario required a longer time to finish. In addition, in their reflective journals (within semester), students mentioned that sessions were not enough to work on scenarios properly. Therefore, modifications were applied to the intervention. The number of scenarios covered within the semester was reduced to six instead of ten or twelve.

Examples of scenarios discussed in the sessions are presented in Appendix Seven. Some of the scenarios were very long and discussed more than one problem and body system starting from pathphysiological problems such as sepsis, ARDS, bleeding, hypotension, and renal failure to family and psychosocial problems. Therefore, it took more than two weeks to complete. With the long case scenarios students were not given the whole scenario as one part. They took it in two or three parts to give them a chance to figure out what was the problem. The impressive thing is that they succeeded in knowing what the case was about through the signs and symptoms mentioned in the scenarios. Then, based on their findings, they were able to find out how they would manage the patient.

3.3.12.2. Care planning:

Care planning was a part of working on the case scenarios. Each group was asked to create a care plan for the problem that had been introduced. At the final session, the three groups discussed their care plans together; this was usually at the fourth session or sometimes could extend to the fifth session. All groups shared their care plans with each other and rationalised why they chose to manage the problem in that way. Some of students mentioned that, since the second year in the college, they had found difficulties in writing down care plans, and one student mentioned that she hated it. But doing that after completing each scenario helped her

and made it easier for her. She related that to the trigger guide which gave her a systematic way of addressing the problem and managing it.

3.3.12.3. Self-directed learning:

As part of the PBL elements, students were expected to do presentations and written assignments. Written assignments aimed at encouraging the students to develop written work on a chosen topic using the information available from the internet resources and text books. Furthermore, students were required to present their work to their colleagues, and there was a plan to motivate them to ask questions, critique each other's work and summarise what they had learned from it. This was expected to improve students' critical thinking abilities. Topics chosen were supposed to be related to the course topics and information given in problems presented in the scenarios. This was not implemented. The reason is that students were busy with many other assignments for this module and other modules, in addition to the examinations which made them unable to do any extra work.

Moreover, as a part of the course evaluation, students were asked to do group presentations. Each group of three or four students worked on one presentation together; the topics were determined previously by the course director and other teachers. After the topics had been distributed between the students, the researcher was given the responsibility of facilitating the presentation sessions of the Intervention group. The researcher prepared evaluation criteria for presentations to evaluate students' presentations. Furthermore, students were asked to peer review each other using the same evaluation form. The sessions where the PBL elements were implemented were completed a week before the final examinations. Within that period the researcher conducted the post-test where the CCTDI questionnaire was completed for the second time by both groups. In addition, the intervention group members were asked to

reflect on their experiences with introducing PBL elements to their course over three months; what they liked and disliked about it compared with other methods and what changes they would like to make. Students were encouraged to write down anything in their mind.

3.3.13. Conclusion

This section described the methodology used in this study. Description of the research setting and the selection of the study participants were provided. The research design adopted to achieve the aims of this study and answer its questions was explained. Moreover, the process and stages of quantitative and qualitative data collection were described in detail. Statistical data and qualitative data analysis methods were described, and ethical issues were highlighted. In addition, detailed information about the intervention applied to this study has been given. The following chapter presents the quantitative results.

Chapter 4: Quantitative results

4.1. Introduction

This chapter presents the results of the quantitative data analysis. As mentioned in the methodology chapter, the CCTDI was used to collect data about students' critical thinking dispositions. In this study, the internal consistency of the CCTDI was performed during the piloting phase. The Cronbach's alpha levels for the subscales ranged from 0.66 to 0.71 and 0.69 for the total subscale. This result was comparable with the result of other studies carried out later with slight variations (Stewart & Dempsey, 2005; Bartlett & Cox, 2002; Mei-Ling, 2001; Stone et al., 2001; Leppa, 1997).

4.2. Demographic characteristics

Sixty-eight third-year Saudi female nursing students participated in the study. Students were randomly assigned to the intervention and control groups. Each group consisted of thirty-four students; four students were deducted from the intervention group because they were either not attending the intervention or chose not to continue. The mean age of the intervention group participants was 20.83 (SD 1.44) and the mean age of the control group was 21.62 (SD 1.95). The mean pre-test GPA was 3.55 (SD 3.55) for the intervention group and 3.52 (SD 0.65) for the control group, whereas the intervention group post-test GPA was 3.54 (SD 0.52) and the control group post-test GPA was 3.42 (SD 0.7). The data indicate that the majority of students were high school graduates with no experience of active learning. In addition, most of the students never experienced working as nurses or working in any other profession.

t-tests were performed to identify whether there were differences between the intervention and control groups' age and pre-test and post-test academic performance such as: GPAs, and mid-term and final grades. In addition, chi-squared tests were performed for the other demographics. There were no significant differences in any of those demographics. Table 4.1 shows the study participants' demographic data, t-tests, and chi-squared tests performed.

Table 4.1: Demographic data

Demographic data N	Intervention group 30	Control group 32	
	Mean (SD)	**Mean (SD)**	**P**
Age	20.83 (1.44)	21.62(1.95)	0.083
Pre-test GPA	3.55 (0.51)	3.52 (0.65)	0.853
Post-test GPA	3.55 (0.52)	3.42 (0.7)	0.479
Mid-term examination	74.96 (9.73)	71.41(11.95)	0.210
Final examination	79.40(7.7)	78.00(8.89)	0.508
	%	**%**	**P**
Academic experience			
Nursing diploma	6.7	20.6	0.110
High school	93.3	79.4	
Work experience			
Yes	20	16.7	0.739
No	80	83.3	
Nursing experience			
Yes	10	16.7	0.448
No	90	83.3	

Demographic data N	Intervention group 30	Control group 32	
	%	%	P
Active learning experience			
Yes	3.3	3.4	0.368
No	96.7	96.6	
Family income			
Below 2000SR	8	9.1	0.233
4000-6000SR	4	13.6	
6000-8000SR	8	13.6	
8000-10000SR	28	31.8	
More than 10000 SR	52	31.8	
Mother's educational level			
Not educated	10	3.3	0.202
Primary school	13.3	36.7	
Intermediate school	26.7	23.3	
High school	20	20	
Bachelor degree	30	13.3	
Postgraduate degree	0	3.3	
Father's educational level			
Not educated	6.9	10	0.976
Primary school	13.8	13.3	
Intermediate school	20.7	16.7	
High school	10.3	16.7	
Bachelor degree	41.4	36.7	
Postgraduate degree	6.9	6.7	

4.3. The intervention and control groups' performance in the CCTDI before and after the intervention

Initially, descriptive statistics were performed to identify each group's total CCTDI score. The result indicates that the entire intervention group completed the pre-test and post-test CCTDI form; whereas 26 students of the control group completed the pre-test and 31 completed the post-test. As shown in Table 4.2, the initial descriptive statistics indicated that the intervention group total score was 277.10 and the control group mean score was 267.84 at the first time of administering the CCTDI. Students' scores were interpreted based on Facione and Facione's (2010) interpretation of the CCTDI scores. Therefore, it was found that both groups' total CCTDI scores revealed that students had low critical thinking dispositions.

The intervention group showed positive dispositions in the following aspects: analyticity (47.06), confidence (42.70), inquisitiveness (47.83) and maturity (40.26); whereas the control group was positively disposed towards analyticity (45.11), confidence (43.84) and inquisitiveness (45.96). Furthermore, both groups showed ambivalence towards critical thinking dispositions of open-mindedness and systematicity; in addition to maturity subscale for the lectures-only group. On the other hand, both groups showed negative disposition in the truth-seeking subscale.

At the second time of administering the CCTDI, the intervention group obtained a total mean score of 287.93 and the control group mean score was 270.7. The total CCTDI score of the intervention group indicated that the intervention group demonstrated positive dispositions towards critical thinking, whilst the control group remained deficient in critical thinking

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dispositions. However, it was observed that, at the second time of administering the test, both groups did not report any negative dispositions at any one of the subscales.

When it comes to students' performance in the subscales, the intervention group reported similar results where they remained positively disposed in: analyticity (46.76), confidence (46.26), inquisitiveness (47.80), and maturity (41.00). Besides, another subscale was added to that, which is systematicity (40.63). On the other hand, the control group remained positively disposed in the same subscales: analyticity (43.54), confidence (42.77), and inquisitiveness (44.83).

The post-test truth-seeking subscale for the intervention group indicated that the control group improved from being negatively disposed to ambivalent towards critical thinking (31.90). They also remained ambivalent towards critical thinking in the open-mindedness subscale (33.56).

The control group remained ambivalent towards critical thinking in open-mindedness (33.25), and systematicity (38.38). In addition, they showed development in their depositions towards critical thinking where they became ambivalent towards critical thinking in truth-seeking (31.45).

Table 4.2: The intervention and control groups' performance in the CCTDI before and after the intervention

	Pre-test			Post-test		
	N	Mean	SD	N	Mean	SD
Truth-seeking						
Intervention	30	28.70	6.17	30	31.90	7.04
Control	26	27.38	6.55	31	31.45	6.85
Open-mindedness						
Intervention	30	32.70	4.89	30	33.56	4.71
Control	26	31.96	5.21	31	33.25	4.53
Analyticity						
Intervention	30	47.06	5.36	30	46.76	6.06
Control	26	45.11	4.99	31	43.54	6.67
Systematicity						
Intervention	30	37.83	8.17	30	40.63	5.78
Control	26	38.34	8.29	31	38.38	7.80
Confidence						
Intervention	30	42.70	9.35	30	46.26	8.52
Control	26	43.84	7.76	31	42.77	7.00
Inquisitiveness						
Intervention	30	47.83	5.78	30	47.80	6.10
Control	26	45.96	5.82	31	44.83	4.45
Maturity						
Intervention	30	40.26	6.34	30	41.00	8.25
Control	26	35.23	7.71	31	36.45	8.29
Total score						
Intervention	30	277.10	28.43	30	287.93	29.74
Control	26	267.84	25.46	31	270.70	25.84

4.4. Comparing difference in CCTDI total score and subscales scores before and after the intervention for each group

Paired sample t-tests were used to identify whether there were significant changes in subscales and total scores between the first and second time of administering the CCTDI for each group separately. Table 4.3 showed that, in the CCTDI, the intervention group obtained a total mean score of 277.10 at the first time of administering the test, and 287.93 at the second time. However, the control group first time mean score was 266.52 and 267.13 at the second time. This indicated that the intervention group demonstrated a significant improvement (p=0.013). However, for the control group, there was no statistical significant difference between the pre-test and post-test total scores (p=0.879).

Regarding the subscales, the intervention group demonstrated significant improvements in the following subscales: truth-seeking, systematicity and confidence. The truth-seeking subscale score was 28.70 at the first time of administering the test and improved to 31.90 at the second time (p=0.025). The systematicity subscale mean score was 37.83 and improved to 40.63, (p=0.045), and the confidence subscale mean score was 42.70 and increased to 46.26, (p=0.006). However, the control group demonstrated a significant improvement in only one subscale, which is truth-seeking. The mean score was 27.04 at first time of administering the CCTDI test and 30.69 at the second time (p=0.028). It is worth noting that, although both groups had significantly improved their truth-seeking, in the first and second times of administering the CCTDI, both groups had scored the lowest in this subscale. Table 4.3 presents the total CCTDI scores for both groups with t-test results.

Table 4.3: Comparing the total CCTDI scores and subscales for the intervention and control group before and after the intervention

	N	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	p
Truth-seeking						
Intervention	30	28.70	6.17	31.90	7.04	0.025
Control	23	27.04	6.86	30.69	6.71	0.028
Open-mindedness						
Intervention	30	32.70	4.89	33.56	4.71	0.278
Control	23	32.04	5.38	33.04	4.91	0.463
Analyticity						
Intervention	23	47.06	5.36	46.76	6.06	0.818
Control	30	44.60	4.85	42.73	7.21	0.187
Systematicity						
Intervention	23	37.83	8.17	40.63	5.78	0.045
Control	30	38.39	7.84	37.95	8.34	0.741
Confidence						
Intervention	30	42.70	9.35	46.26	8.52	0.006
Control	23	43.52	8.15	42.39	7.83	0.509
Inquisitiveness						
Intervention	30	47.83	5.78	47.80	6.10	0.966
Control	23	45.69	6.06	45.00	6.21	0.549
Maturity						
Intervention	30	40.26	6.34	41.00	8.25	0.519
Control	23	35.21	7.90	35.30	7.77	0.957
Total score						
Intervention	30	277.10	28.43	287.93	29.74	0.013
Control	23	266.52	24.51	267.13	25.40	0.879

4.5. Comparing total CCTDI scores and subscale scores between the intervention and control groups before and after the intervention

An independent sample t-test was performed to identify any difference between the two groups at first and second attempt of administering the CCTDI. As shown in Table 4.4, the total CCTDI score of the intervention group was not significantly different from that of the control group at the first time of administering the test (p= 0.208). However, at the second time of administering the test after the intervention of the PBL elements was completed, the intervention group obtained a significantly higher score than the control group (p=0.019). This supports the hypotheses that the intervention group would demonstrate higher levels of critical thinking dispositions than the control group students.

Regarding differences in subscale scores, the pre-test shows that the intervention group demonstrates a statistically significantly higher score in one subscale, which is maturity (p= 0.010). On the other hand, the post-test shows that the intervention group demonstrates significantly higher scores in the following subscales: analyticity (p= 0.054), inquisitiveness (p= 0.050), and maturity (p=0.036).

Table 4.4: Differences between the intervention and control groups total CCTDI scores and subscales scores before and after the intervention

Subscales and total	Intervention (SD)	N	Control (SD)	N	p
Truth-seeking					
Pre-test	28.70 (6.17)	30	27.38 (6.55)	26	0.443
Post-test	31.90 (7.04)	30	31.45 (6.85)	31	0.802
Open-mindedness					
Pre-test	32.70 (4.89)	30	31.96 (5.21)	26	0.587
Post-test	33.56 (4.71)	30	33.25 (4.53)	31	0.795
Analyticity					
Pre-test	47.06 (5.36)	30	45.11(4.99)	26	0.167
Post-test	46.67(6.06)	30	43.54 (6.67)	31	0.054
Systematicity					
Pre-test	37.83 (8.17)	30	38.34 (8.29)	26	0.817
Post-test	40.63 (5.78)	30	38.38 (7.80)	31	0.208
Confidence					
Pre-test	42.70 (9.35)	30	43.84 (7.76)	26	0.623
Post-test	46.26 (8.52)	30	42.77 (7.00)	31	0.085
Inquisitiveness					
Pre-test	47.83 (5.78)	30	45.96 (5.82)	26	0.234
Post-test	47.80 (6.10)	30	44.83 (5.45)	31	0.050
Maturity					
Pre-test	40.26 (6.34)	30	35.34 (7.71)	26	0.010
Post-test	41.00 (8.25)	30	36.45 (8.29)	31	0.036
Total score					
Pre-test	277.1(28.43)	30	267.8(25.46)	26	0.208
Post-test	287.9(29.74)	30	270.7(25.84)	31	0.019

4.6. Comparing pre-test and post-test GPAs for each group

Each group pre-test GPA was compared to the post-test GPA using a paired sample t-test. The result revealed that there was no significant change in any of the groups' GPAs; this is presented in Table 4.5.

Table 4.5: Comparing the difference in GPAs for each group

GPA	Pre-test (SD)	Post-test (SD)	N	p
Intervention	3.55 (.51)	3.57 (.52)	25	0.676
Control	3.49 (.63)	3.30 (.69)	20	0.148

4.7. The relationship between students' demographic data and academic performance

One of the study aims was to identify whether students' demographic characteristics had a relationship to students' academic performance, including their GPAs, mid-term and final examination grades, and critical thinking abilities; a one-way ANOVA test was used. In order to do that, continuous variables such as age or the others which are with more than three categories were re-coded and condensed into two or three categories. These variables were: age, family income, mother's educational level, and father's educational level. The results in Table 4.6 indicate that age positively correlates with pre-test GPA (p=0.032) and final examination grades (p=0.010). Furthermore, students' pre-test GPA was significantly related to academic experience (p=0.036), which indicates that students who had a nursing diploma before entering the college had higher GPAs than those who had a high school certificate. The post-test GPA was significantly related to nursing experience (p=0.025); students who had nursing experience obtained significantly higher post-test GPAs than those who did not. The final examination result was significantly related to work experience (p=0.008) and

nursing experience (p=0.001). Students who indicated that they had experience of work and nursing care are the ones who obtained significantly higher GPA scores, mid-term and final examination grades. There were no relationships between family income and students' GPAs, mid-term and final examination results.

Studying the relationship between students' grades and active learning experience was not applicable. This is due to the impossibility of performing the test of homogeneity; because there is a group of only one case. The post-hoc test showed that there was a statistically significant difference between the group of students whose fathers had completed school education and those whose fathers held a bachelor degree (p=0.029). Students whose father had a school degree had higher mid-term examination grades than those of the students whose father had a bachelor degree. The post-hoc test was not applicable for the other demographic information since they had fewer than three categories. In addition, others with three categories such as family income and mother's education variables did not show any significant difference between their groups

4.8. The relationship between students' demographic data and critical thinking disposition

The relationship between students' demographic characteristics and the CCTDI was studied. The result in Table 4.7 showed that, at the first time of administering the test, there was a negative relationship between age and the following subscales: confidence (p=0.016) and maturity (p=0.027). Moreover, there was a significant relationship between the academic experience and analyticity (p=0.037), systematicity (p=0.050) and confidence (p=0.011). Working experience negatively correlates with truth-seeking (p=0.013) and positively correlates with confidence (p=0.051). Nursing experience negatively correlates with truth-

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seeking (p=0.010) and positively correlates with confidence (p=0.046). This means that students who had work and nursing experiences demonstrated higher confidence than those who had not. On the other hand, students who have no nursing experience are more likely to be truth-seekers than the others who mentioned that they have. A significant relationship was also found between family income and open-mindedness (p=0.037) and maturity (p=0.018). The post-hoc test was performed for the family income since it consists of more than three variables. It was found that there were statistically significant differences in the open-mindedness and maturity subscales between the group of students whose income was lower than 8000SR and those whose income was more than 10,000SR. When the relationship between parents' educational level and the CCTDI was studied, a significant relationship was found between mother's education and open-mindedness (p=0.002). The post-hoc test showed that the significant difference occurred among the school and university groups. There was no significant relationship between fathers' education and the pre-CCTDI test and its subscales. Studying the relationship of the CCTDI and subscales scores with the active learning experience was not applicable due to the impossibility of performing the test of homogeneity and because there was only one case.

Regarding the relationship between students' demographics and the post-test CCTDI and subscales, Table 4.8 demonstrates a negative correlation between age and truth-seeking (p=0.016) and open-mindedness (p=0.033). In addition, it was found that family income was significantly related to truth-seeking (p=0.036) and maturity (p=0.055). The post-hoc test, using a Bonferroni correction indicated that students whose families had higher income had higher truth-seeking abilities and maturity compared with those who were from families with lower income. A similar previous case, studying the relationship of the CCTDI and subscales scores with the active learning experience was not applicable.

Table 4.6: The relationship between students' demographic data and academic performance

Demographic data	Pre-test GPA		Post-test GPA		Mid-term		Final	
	Mean (SD)	p	Mean (SD)	P	Mean (SD)	p	Mean (SD)	P
Age								
20-24	3.48 (.56)	0.032	3.43 (0.55)	0.442	72.36 (10.39)	0.933	77.29 (7.80)	0.010
25-28	4.06 (.40)		3.71 (1.27)		72.80 (17.21)		87.00 (7.93)	
Academic experience								
Nursing diploma	4.00(0.39)	0.036	3.56(0.94)	0.742	74.55(13.8)	0.684	81.44(11.18)	0.282
High school	3.47(0.57)		3.48(0.55)		72.92(10.55)		78.20(7.76)	
Work experience								
Yes	3.73 (.51)	0.266	3.73 (.74)	0.163	72.90 (12.20)	0.924	84.27 (6.87)	0.008
No	3.48 (.59)		3.41 (.57)		72.55 (10.79)		77.00 (8.07)	
Nursing experience								
Yes	3.75 (0.58)	0.301	4.04 (.65)	0.025	76.12 (10.2)	0.335	87.00 (5.31)	0.001
No	3.50 (.57)		3.41 (.57)		72.06 (11.07)		77.00 (7.90)	

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Demographic data	Pre-test GPA Mean (SD)	p	Post-test GPA Mean (SD)	P	Mid-term Mean (SD)	p	Final Mean (SD)	P
Family income								
Below 8,000	3.52(0.44)	0.776	3.24(0.62)	0.150	76.46(8.71)	0.593	74.46(8.71)	0.596
8,000–10,000	3.63(0.71)		3.67(0.48)		78.21(7.11)		78.21(7.11)	
More than 10,000	3.53(0.60)		3.39(0.55)		79.35(7.91)		79.35(7.91)	
Mother's education								
Not educated	3.25(0.06)	0.636	3.33(0.10)	0.654	77.25(6.18)	0.536	80.00(4.96)	0.872
School	3.57(0.63)		3.52(0.65)		72.87(11.74)		78.42(9.18)	
University	3.50(0.47)		3.36(0.55)		70.38(9.40)		77.57(6.36)	
Father's education								
Not educated	3.45(0.61)	0.247	3.32(0.06)	0.142	71.40(8.35)	0.029	80.80(7.98)	0.429
School	3.70(0.52)		3.64(0.62)		76.62(9.66)		79.14(8.96)	
University	3.41(0.60)		3.30(0.60)		68.64(11.72)		76.92(7.88)	

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Table 4.7: The relationship between students' demographic data and pre-test total CCTDI and subscales scores

Demographic data	Truth Mean (SD)	p	Openmin Mean (SD)	p	Analy Mean (SD)	p	System Mean (SD)	p	Confid Mean (SD)	p	Inquisi Mean (SD)	p	Matur Mean (SD)	p	Total Mean (SD)	p
Age																
20-24	28.81 (6.13)	0.057	33.10 (4.74)	0.076	45.91 (5.16)	0.564	37.95 (7.79)	0.493	42.39 (7.84)	0.016	47.52 (5.56)	0.428	38.58 (7.18)	0.027	274.29 (25.64)	0.062
25-28	22.50 (7.59)		28.75 (1.50)		47.50 (6.24)		40.75 (7.41)		52.50 (6.55)		45.25 (3.40)		30.00 (8.20)		267.25 (27.51)	
Academic experience																
Nursing diploma	25.85 (8.95)	0.323	29.71 (4.34)	0.137	50.00 (5.65)	0.037	43.71 (7.04)	0.050	50.85 (7.24)	0.011	46.28 (4.46)	0.745	34.42 (9.27)	0.183	280.85 (28.99)	0.408
High school	28.40 (5.91)		32.73 (5.02)		45.61 (5.00)		37.26 (8.05)		42.14 (8.26)		47.06 (6.03)		38.42 (7.06)		271.65 (27.11)	
Work experience																
Yes	23.70 (7.42)	0.013	30.20 (5.07)	0.080	48.10 (3.95)	0.180	41.90 (6.77)	0.107	48.10 (9.19)	0.051	47.40 (4.71)	0.912	35.40 (8.98)	0.269	274.80 (21.77)	0.884
No	29.23 (5.76)		33.16 (4.64)		45.65 (5.35)		37.51 (7.79)		42.39 (7.89)		47.18 (5.66)		38.34 (7.15)		273.48 (26.31)	
Nursing experience																
Yes	22.87 (5.11)	0.010	30.37 (4.17)	0.158	48.25 (4.52)	0.209	39.00 (7.11)	0.797	48.87 (8.70)	0.046	45.50 (4.24)	0.336	35.50 (10.54)	0.355	270.37 (20.59)	0.688
No	29.13 (6.20)		33.00 (4.86)		45.73 (5.24)		38.22 (7.92)		42.51 (8.03)		47.53 (5.63)		38.20 (6.94)		274.33 (26.23)	

Demographic data	Truth Mean (SD)	p	Openmin Mean (SD)	p	Analy Mean (SD)	p	System Mean (SD)	p	Confid Mean (SD)	p	Inquisi Mean (SD)	p	Matur Mean (SD)	p	Total Mean (SD)	P
Family income																
Below 8,000	24.10 (5.54)	0.061	30.70 (2.00)	0.037	43.70 (5.33)	0.293	34.60 (8.87)	0.349	44.30 (10.52)	0.504	46.30 (6.76)	0.777	31.90 (6.11)	0.018	255.60 (24.94)	0.091
8,000-10,000	26.83 (5.33)		32.41 (4.92)		47.16 (5.32)		38.58 (9.80)		44.33 (6.48)		47.91 (3.70)		37.08 (6.96)		274.33 (22.85)	
More than 10,000	29.83 (6.63)		35.27 (5.15)		45.38 (4.80)		39.27 (6.75)		41.00 (9.17)		46.55 (6.67)		40.00 (7.20)		277.33 (26.55)	
Mother's education																
Not educated	26.50 (6.45)	0.857	33.75 (3.59)	0.002	46.75 (4.78)	0.697	35.25 (3.86)	0.602	38.00 (9.01)	0.234	50.75 (2.62)	0.337	42.25 (9.77)	0.073	273.25 (31.27)	0.394
School	28.25 (6.42)		31.13 (3.95)		45.69 (5.51)		38.19 (8.16)		44.66 (7.23)		46.63 (5.12)		36.19 (7.17)		270.77 (23.00)	
University	28.53 (6.81)		36.30 (5.49)		47.07 (4.49)		39.69 (7.47)		41.84 (10.65)		47.76 (6.72)		40.84 (6.85)		282.07 (29.84)	
Father's education																
Not educated	24.80 (2.16)	0.427	31.80 (3.96)	0.870	47.20 (6.83)	0.736	43.40 (6.22)	0.127	42.40 (10.71)	0.838	48.20 (3.70)	0.107	37.40 (7.09)	0.786	275.20 (22.17)	0.647
School	28.96 (7.20)		32.96 (5.64)		45.68 (5.69)		36.40 (7.82)		44.52 (8.12)		46.00 (5.62)		36.88 (8.72)		271.40 (30.04)	
University	28.31 (6.08)		32.45 (4.20)		46.68 (4.15)		39.50 (7.68)		43.77 (6.21)		49.09 (4.27)		38.40 (6.02)		278.22 (18.09)	

Table 4.8: The relationship between students' demographic data and post-test total CCTDI and subscales scores

Demographic data	Truth Mean (SD)	p	Openmin Mean (SD)	p	Analy Mean (SD)	p	System Mean (SD)	p	Confid Mean (SD)	p	Inquisi Mean (SD)	p	Matur Mean (SD)	p	Total Mean (SD)	P
Age																
20-24	32.26 (6.7)	0.016	33.84 (4.6)	0.033	45.07 (6.6)	0.666	39.84 (6.6)	0.325	44.30 (7.8)	0.290	46.52 (5.9)	0.734	39.03 (8.6)	0.220	281 (27.3)	0.223
25-28	24.60 (4.8)		29.20 (3.8)		46.40 (5.8)		36.80 (6.4)		48.20 (7.4)		45.60 (3.6)		43.00 (9.1)		265 (34.5)	
Academic experience																
Nursing diploma	30.22 (7.69)	0.449	33.11 (6.05)	0.834	47.88 (5.60)	0.172	39.88 (6.54)	0.854	46.33 (8.47)	0.455	46.22 (3.89)	0.969	38.78 (8.59)	0.828	281.77 (32.93)	0.773
High school	31.92 (6.79)		33.46 (4.35)		44.65 (6.60)		39.42 (7.04)		44.17 (7.86)		46.30 (6.24)		38.68 (8.52)		278.73 (28.51)	
Work experience																
Yes	30.54 (7.68)	0.527	31.72 (3.97)	0.179	47.27 (4.73)	0.279	39.72 (5.86)	0.985	46.45 (6.60)	0.441	48.09 (4.41)	0.335	39.09 (9.47)	0.840	282.90 (33.38)	0.734
No	32.02 (6.75)		33.83 (4.75)		44.89 (6.82)		39.77 (6.86)		44.41 (8.10)		46.20 (6.04)		38.50 (8.55)		279.64 (27.48)	
Nursing experience																
Yes	31.1 (8.42)	0.787	31.25 (4.43)	0.155	46.87 (5.96)	0.478	40.75 (5.06)	0.655	45.87 (8.02)	0.679	46.75 (5.41)	0.921	39.75 (10.79)	0.692	282.37 (36.07)	0.822
No	31.84 (6.7)		33.78 (4.64)		45.09 (6.62)		39.60 (6.88)		44.62 (7.87)		46.52 (5.89)		38.43 (8.38)		279.92 (27.41)	

Demographic data	Truth Mean (SD)	p	Openmin Mean (SD)	p	Analy Mean (SD)	p	System Mean (SD)	p	Confid Mean (SD)	p	Inquisi Mean (SD)	p	Matur Mean (SD)	p	Total Mean (SD)	p
Family income																
Below 8,000	30.00 (8.38)	0.036	32.69 (3.85)	0.0454	44.61 (8.55)	0.917	38.53 (7.24)	0.804	46.1 (8.72)	0.473	44.30 (5.87)	0.339	34.38 (9.92)	0.055	270.69 (27.77)	0.405
8,000-10,000	28.50 (5.93)		34.92 (5.1)		44.28 (5.79)		38.42 (4.43)		43.92 (6.08)		47.71 (4.41)		35.28 (8.25)		273.07 (18.68)	
More than 10,000	34.60 (6.58)		33.65 (4.65)		45.25 (6.34)		39.80 (7.72)		42.80 (7.86)		46.05 (6.93)		41.05 (7.59)		283.20 (34.00)	
Mother's education																
Not educated	33.50 (4.12)	0.233	29.75 (2.98)	0.244	46.25 (7.13)	0.373	41.75 (4.27)	0.814	44.50 (9.81)	0.423	47.59 (5.00)	0.717	38.00 (9.30)	0.204	281.25 (30.43)	0.516
School	30.73 (7.21)		33.56 (4.40)		44.56 (6.73)		39.51 (6.93)		45.63 (7.50)		46.14 (5.74)		37.43 (8.69)		277.58 (27.02)	
University	34.21 (6.11)		34.14 (5.51)		47.35 (5.62)		39.92 (6.59)		42.42 (8.37)		47.50 (6.35)		42.21 (7.92)		287.78 (32.42)	
Father's education																
Not educated	27.80 (8.31)	0.372	32.20 (4.14)	0.633	47.00 (2.34)	0.779	41.40 (3.57)	0.829	46.00 (5.61)	0.818	46.80 (3.34)	0.807	34.00 (5.14)	0.484	275.20 (7.91)	0.912
School	32.59 (7.48)		33.22 (5.25)		44.77 (8.20)		39.48 (8.41)		45.55 (9.34)		46.18 (6.56)		38.59 (9.79)		280.40 (36.88)	
University	31.65 (6.08)		34.11 (4.12)		45.42 (5.09)		39.46 (4.88)		44.34 (6.04)		47.23 (5.24)		39.07 (7.73)		281.30 (20.89)	

4.9. The relationship between students' critical thinking dispositions and their academic performance

Pearson correlation was used to identify whether there is a relationship between students' thinking abilities and performance in exams and end of semesters' GPAs. The result indicated that there was a negative relationship between the total CCTDI scores and intervention group GPAs (r=-0.201, DF=23, p=0.335), mid-term examination results (r=-0.111, DF=28, p=0.558), and final examination results (r=-0.249, DF=28, p=0.185). However, for the control group only a negative correlation was found between the total CCTDI scores and GPAs (r=-0.135, DF=14, p=0.618).

It can be suggested that, in the above findings, the small number of the study sample plays an important role here which is affecting the statistical power. However, it might be important to report all negative correlations even they were not significant. The above findings are very important since they indicate that students who have more thinking abilities have lower GPAs and performance in examinations.

4.10. Conclusion

This chapter presented the quantitative data analysis findings. The pre-test results of the CCTDI indicated that both groups had low critical thinking dispositions. However, the post-test results showed that the intervention group's critical thinking disposition has significantly improved, whilst the control group remained deficient. In addition, when both groups were compared to each other, the post-test CCTDI revealed that the intervention group had demonstrated significant higher critical thinking disposition than the control. The result also showed that there were no significant differences in academic performances of both groups.

The results indicated that there was a relationship between students' demographic data and their academic performance. Students' age, experiences, and parents' education statistically affect their academic performance. However, there was no association between students' demographic data and their critical thinking disposition. Finally, a negative correlation was found between students' academic performance and their critical thinking disposition. The next chapter will present the qualitative data analysis findings in detail.

Chapter 5: Qualitative results

5.1. Introduction

This section presents the findings from qualitative data gathered in this study. Qualitative data includes students' end-of-semester reflective journals, as well as other qualitative data gathered from the within-semester reflective journals, group discussions, field notes, and data from observation of teaching sessions. For completing the end-of-semester reflective journals, students were asked to reflect on their experience with the intervention which is introducing the PBL elements to their course, and their experience with other traditional teaching methods. They were encouraged to discuss their observations and opinions; what they had learned, how they learned it, and the advantages and disadvantages of the sessions of the PBL elements and other teaching methods. The rationale behind analysing all data collected either within the semester or at the end was to identify whether incorporating the PBL elements in the traditional course had affected students positively or negatively; in addition, to help in interpreting quantitative findings, and to inform the researcher about the intervention through highlighting areas requiring modification and improvement. The 'Framework' method described by Ritchie and Spencer (1994) was used to analyse data collected from the journals. Further details about this approach and the process of analysing the qualitative data were given in the methodology and methods chapter.

The following will show how themes were shaped:

5.2. Stage I

5.2.1. Initial major themes identified:

- Reflection on the traditional teaching approach

- Reflection on the intervention

- Reflection on clinical practice

5.2. 2. Subthemes identified under each major theme:

5.2.2.1. Reflection on the traditional teaching approach subthemes:

- Dissatisfaction with lectures

- Assignments and exams

- Absenteeism

- Evaluation methods

- Participating in the learning process

- College support, encouragement, and expectations

- Theory practice gap

- Expectations

- Thinking and analysing

- Effect on psychological condition

5.2.2.2. Reflection on the intervention subthemes:

- Satisfaction

- Thinking, analysing and discussing

- Learning outcome

- Participating in learning process

- Linking theory to practice

5.2.2.3. Reflection on clinical practice subthemes:

- Dissatisfaction

- Evaluation methods

- Learning outcome

- Linking theory to practice

5.3. Stage II

Data shared between the major themes or subthemes were gathered and discussed under the same title (same theme). That resulted in some of the major themes being categorised as subthemes and vice versa. For example, reflection on traditional teaching methods and reflection on the intervention major themes became subthemes and were discussed under 'satisfaction', which became a major theme. In addition, effects on psychological wellbeing was considered as a major theme since data under this category are rich and important. Learning outcome became a major theme and it has included the following subthemes: improvements of grades and performance, linking theory to practice, enhanced thinking and analysing, and greater participating in the learning.

This resulted in the following major themes:

- Satisfaction

- Personal growth

- Effect on psychological condition

- Learning outcome

- Evaluation methods

- Reflecting on the clinical practice

5.4. Stage III

Effect on psychological condition was changed to effects on emotional wellbeing. In addition, the personal growth title was changed to 'communication skills', since most students' reflections were about how their communication developed through discussion and group work, in addition to how that affected other personal developments such as self-confidence. Besides this, evaluation methods was changed to 'assessment methods'. Through re-reading the reflective journals, going through students' comments, and analysing them, it was found that communication skills are more likely to be under the learning outcome major theme since students' claims suggested that communication skills are a learning outcome of the intervention Therefore, the number of themes was reduced to five. In addition, it was decided to divide the satisfaction theme into three sections, which are detailed below.

5.5. Stage IV: Formulating the final structure of the themes:

5.5.1. Satisfaction

5.5.1.1. Satisfaction with the traditional teaching approach

5.5.1.2. Satisfaction with the idea of the intervention

5.5.1.3.Satisfaction with the way the intervention was implemented

5.5.2. Effects on emotional wellbeing

5.5.3. Learning outcome

5.5.3.1. Communication skills

5.5.3.2. Improvements of grades and performance

5.5.3.3. Linking theory to practice

5.5.3.4. Enhanced thinking and analysing

5.5.3.5. Greater participation in the learning process

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5.5.4. Assessment methods

5.5.5. Reflection on the clinical practice

Quotes used as a reference to the data in this chapter were collected from students' reflective journals, group discussions, field notes, and observation of teaching classes. Reflective journals which were written in Arabic were translated into English, and those written in English were re-written to ensure that they do not have any grammatical errors and they are presented in a proper style which meets the academic standards.

5.6. Students' perceptions of the intervention and other learning and teaching approaches

5.6.1. Satisfaction

5.6.1.1. Satisfaction with the traditional teaching approach

In general, students reported dissatisfactions with the traditional teaching approach. They considered it to be boring and not enjoyable, and they related their perceptions to lack of concentration, lack of updates, and the length of lectures, which sometimes exceeded three hours. One student described how the traditional teaching approach affected her level of concentration, and she reflected on class hours and the amount of information she received:

> 'At the beginning of the lecture I try to listen to the teacher. But, I end up with being not able to concentrate. Teachers just read from slides; lectures are only about finishing a number of slides ... we stay in the classroom for more than three hours; I remember one day we end up with going through 92 slides' (End of semester RJ/case2).

The student below highlighted a very important issue about updating of teaching materials. The student considered the traditional lectures to be static and lacked development. It might

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be noted that such traditional lectures might not help students to keep 'up-to-date' on current evidence:

'Information is not updated' (End of semester RJ/case6).

In the following example students discussed the issue of updating teaching materials widely:

'During one of the classes the teacher mentioned information which is from an old edition book different from the new one we have. Therefore, since I read the topic she was teaching us, I stand up and told her that the information she mentioned is different from that in the new edition. The teacher said I don't care about the book you have at home just listen to what I say. In the exam you should write down what is mentioned here in my presentation. I was totally shocked and sat down without saying a word' (Discussion group1).

There was also the issue of the teacher-student relationship. The quote above indicates that the relationship between the students and their teachers was not flexible. This might lead to students avoiding discussing anything related to their education, resulting in negative consequences such as poor performance. There are also other considerations such as personal problems. It is important to form a flexible relationship with the students since that will improve their personal development and might help in solving their problems. When students find it easy to approach their educators, they will be able to discuss with them anything they face. That will help in finding solutions to a lot of conditions before they worsen. This will save students from reaching the stages of disappointment, depression, and lack of confidence.

Updating materials was supported by another student who mentioned:

'... people use information in the newly released books to update the old ones. But, us we do the opposite. We buy the new edition book then we change the

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information mentioned in it using the old edition. Because our doctors don't want

to change their old handouts they prepared years ago' (End of semester RJ/case17).

Students perceived lectures to be concerned with quantity of information rather than quality

and this can be seen as an important reason for their dissatisfaction:

'In teaching they care about the quantity rather than the quality' (Discussion

group1).

It can be seen that the bulk of information that students receive in a short time resulted in

students being unable to concentrate and use what was said in the lecture. Furthermore, not

trusting the information delivered by the teacher made students consider lectures to be

unhelpful, and consequently they lost interest in attending them. This was concluded from

students' reflections.

'Reading books and studying on my own is better than attending boring lectures'

(End of semester RJ/case1).

'When I study on my own without attending I get the same mark as if I attended'

(End of semester RJ/case6).

Students being not trusting of teachers' information might be a consequence of another

factor. There was a student who explained how there were conflicts between the information

she received from the teacher in school and that received from the clinical instructor in the

hospital. She said:

'... I am not generalising but most of them they don't have enough knowledge ... I

had an experience with one of the doctors. I asked her and she answered me. Then,

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in the hospital the same thing was explained by a clinical instructor, it was totally different' (End of semester RJ/case6).

It can be argued that considering the quantity rather than the quality, conflicts in information, and not receiving up-to-date information have resulted in lectures not meeting students' expectations. As a result, a serious problem presented itself, which was increasing student absenteeism rate. One student mentioned that she was expecting a DN (fail) in one of the subjects. This kind of warning is given to students who are exceeding the allowed limit of absenteeism:

'... it is the first time in my life to get a notification of DN (fail) ...' (End of semester RJ/case4).

This student is an A student and, although attendance should not be an issue for her, it has become one. Therefore, her absenteeism may be a consequence of dissatisfaction. This was also was mentioned by another student:

'The girls are bored. So the only solution is not attending' (End of semester RJ/case15).

Students related the reason for not attending the lectures to spending long hours in the hospital:

'We leave the hospital very late and this made me very tired. Because of that I don't attend the afternoon classes' (End of semester RJ/case3).

'Six hours in the hospital and three hours in the class; is that logical?' (End of semester RJ/case9).

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They also considered the assignments to be one of the factors in not attending:

> 'We have too much work and assignments; that's why I escape some of the classes, to do my work' (End of semester RJ/case4).

It is worth mentioning that assignments and work students are required to perform are within the normal range. However, studying two courses at the same time resulted in students being placed under pressure. Before, they used to study each course separately, which means they start with one course and study it over seven weeks. Then, they start the second one, which means the semester is divided into two parts. The first part is for one course and the other part is for another one. However, in the third year, it was decided to give the two courses at the same time, different from what the students had been used to. So, instead of studying each course for seven weeks, students study both courses together for fourteen weeks. So, they have to do the work of both courses at the same time.

> 'They started the system of having two courses in one semester. Opposite with the previous years, students were studying one course, finishing it and then starting with the new one. This was very hard ... we suffered from the pressure of never-ending reports, hospital training, homework, and examinations' (End of semester RJ/case17).

It was observed that students' absenteeism increased, especially before examinations. Approximately 50% of the intervention group participants did not attend the afternoon classes if they had an examination the following day. Figure 5.1 shows students' attendance rate during the whole semester. Day one to day thirteen showed students' attendance from the beginning of the semester until the middle where no examinations were scheduled; more than 70% of the students were attending. However, day 14 was the day prior to the mid-term

examination. The diagram demonstrates a dramatic decline in students' attendance; more than half of the class was absent. Day 17 is week 10, which is the first week after the mid-term holiday; students' attendance was 100%. The same issue happened again at day 24, which was week 13, the week before final examinations, when 50% of the class was absent. Days 15 and 16 are not shown in the diagram since those days represent the mid-term holiday week. Similarly, days 19 and 20 were also not included because classes were cancelled. These data were collected from the attendance sheet of the intervention group only.
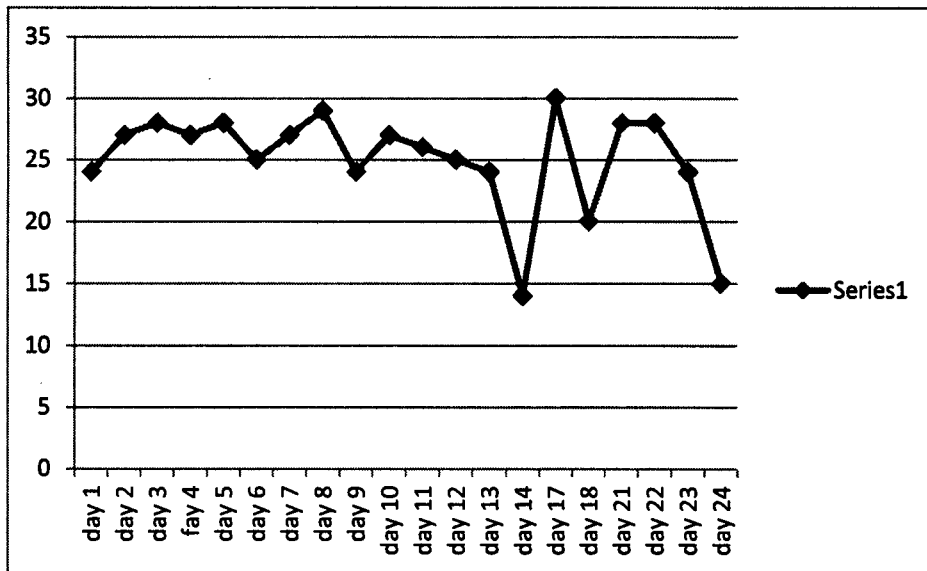
Figure 5.1: The intervention group attendance, n=30

Students rationalised their absenteeism before the examinations days by saying:

'We have a lot of handouts and chapters in the books we have to study and memorise every single word of it and if we attend the afternoon class we will reach home very exhausted and could not study' (End of semester RJ/case15).

'Before exams I have to spend a week to study for one subject' (End of semester RJ/case7).

This sheds light on a very important issue, which is the huge amount of material taught to students, and the fact that they are expected to memorise every single word of it. Students are very concerned with this issue because their performance in answering the examination questions is based on memorisation rather than understanding. This imposed a burden on students and put them under physical and mental pressure. This issue will be discussed in more depth later under the assessment methods theme:

> 'We should study, memorise, and write down everything in the examination paper. We are tired of the pressure applied on us. My brain cannot tolerate that' (End of semester RJ/case 15).

Although most of students' reflections suggested that they were frustrated and not happy, the research found that there was one student who was positive about her experience in school. The student started writing her reflective journal by saying she was positive and full of motivation, even with all difficulties she thought she was facing in the school. These are some examples of her positive view.

> 'I started to like nursing and I wanted to complete in this college because I want to support my family and society ... It was very nice to help patients; it was nice when they pray for us' (End of semester RJ/case11).

Another student mentioned that students take a part of the responsibilities and they should try to improve instead of blaming the faculty. She said that the faculty were good; problems might be as a result of the lack of coordination and time:

> 'I don't want to blame the university ... I don't blame the doctors because they are pressurised by the lack of coordination and the administration. To be fair, I think we students take some part of the responsibility; because we don't know how to

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organise ourselves, all we do is blame the others and ignore our responsibility. We are just wasting our time and energy in complaining ... we can solve 10% of that. We shouldn't lose everything, we should try to improve our grades and change ourselves in a better way' (End of semester RJ/case11).

5.6.1.2. Satisfaction with the idea of the intervention

Students' reflections on the intervention of the PBL elements were totally different from those on lecturing. They mentioned that they enjoyed the experience of introducing the PBL elements to their course; they found this intervention to be active, useful, and an interesting and easy way of learning. It helped them to understand and they started to have confidence in their abilities. As result, they had hope that they could be better. Students said that they were experiencing a new way of learning, different from the routine lectures they were used to. They liked the idea of working together and sharing information:

'... it is a great idea, it was fun and we would benefit from it if it was applied to all courses' (End of semester RJ/case 1).

'It is good, useful, and active' (RJ2/case1).

'... I was very happy and interested to join. Because I didn't like the routine and I wanted to change. I was lucky to be one of the PBL group' (End of semester RJ/case 11).

Describing the intervention as an active way of learning is important and should be highlighted. The way of engaging students in this process through working on the scenarios, findings solutions for the problems, and discussing that with the other colleagues led to that. This is different from the one way teaching; the intervention, being an active approach to

learning, will increase students' interest in learning and this has been highlighted by the students, as follows:

'I feel good about the session and I am very interested' (RJ2/case3).

Some students perceived the intervention to be a simple and easy way of learning:

'There were no difficulties. It was an easy and smooth way of learning' (RJ1/case1).

'My feeling is very good towards this way of learning ... it made me understand in an easy way and share information ... I was satisfied' (RJ1/case3).

The student below related her satisfaction to the reason that the intervention is a new idea with objectives; in addition to the information she gained during the sessions:

'All sessions were excellent ... I am very happy about the search I did ... I got benefits from the information I gained. There are new objectives and ideas' (RJ2/case8).

Other students related their satisfaction to sharing information with the others, discussing it and working on their own:

'I like the idea of PBL because I participate in sessions. Then, go and look for the information on my own' (End of semester RJ/case1).

'I am very excited to search, learn, and get involved in the discussions' (RJ2/case 5)

'I like the discussion, assignments, and self work' (RJ1/case6).

Students' satisfaction made them wish that this strategy would continue and be incorporated into all courses:

> 'From my point of view, it is a successful programme; I hope it can be continued and applied to next year' (End of semester RJ/case4).

> 'I hope we can have only PBL instead of lectures. What you are doing gave me a lot of hope' (End of semester RJ/case4).

The words students used (such as 'excellent, good, fun, happy, active, hope, discussion, participate, self work, objectives, ideas') provide the impression that introducing new ways of teaching students, as well as applying clear objectives, would make learning more interesting than following one strategy. In addition, engaging students in learning will allow them to enjoy the way they learn since they decide what they need to learn and look for. In addition, interacting together can make them more active and stops them from being bored.

The student below described how her colleagues interacted with her during her presentation and how this made her happy and satisfied; especially, because they were able to understand:

> 'I am so happy and satisfied to be in the PBL group. Because I learned more and more, and I learned how to deal with people and discuss with them ... I provided a presentation about epinephrine [adrenaline]. I was surprised that all the class interacted with me. I was happy that the girls understood what I said' (RJ1/case4).

It could be argued that this kind of feeling might contribute to increasing students' confidence and performance since they participate in their process of learning. Furthermore, another reflection suggested that using stories and patients' cases in education might enhance students' learning and satisfaction:

'It is good because sessions are about stories' (RJ1/case14).

5.6.1.3. Satisfaction with the way the intervention was implemented

Students mentioned some disadvantages about the intervention, which were discussed in the within-semester reflective journals and the end-of-semester reflective journals. Regarding the within-semester reflective journals, students completed the journals after completing the PBL elements sessions for the first two course topics. They chose not to do any for the following sessions since they found themselves repeating the same information; in addition to the effect of the workload they had. However, those journals had done their jobs as the researcher made changes to the ways the intervention was implemented.

Most of students commented on the time of the sessions; they said it was late. They perceived this affecting their concentration and performance. The sessions being held at the end of the day were exhausting to students and overwhelming:

> 'The session is late, from 3 to 4 pm. By that time we are tired and sometimes can't contribute' (RJ1/case8).

> 'We are staying until late. Sometimes I am lacking concentration' (RJ1/case6).

> 'At the end of the day we were very exhausted and it affects our participation. It is somehow overwhelming because we are already loaded with other courses' (RJ1/case3).

Most students perceived the length of each session to be insufficient to work properly:

> '... A one-hour discussion session is not enough' (RJ1/case2).

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'... One hour is not enough to do and explain everything' (RJ1/case6).

'The time is limited, and I think this learning way needs a longer time in order to be more effective' (RJ1/case3).

The time of the sessions was discussed with the course leader, but there was no opportunity to change it due to students' commitments with other lectures. However, students' comments did result in modifications to the way the sessions were implemented. At the beginning, it was decided to spend a week in each case scenario, which was sometimes not enough to go through every part of it. This might be the reason for students being not happy. Therefore, it was decided to give each scenario enough time without being worried about the next one. This led to working on each part of the scenario more fully and as a result students' satisfaction increased. In contrast, the following scenarios were affected; they were discussed later than their proposed date and they were no longer synchronised with the course syllabus. This was a disadvantage, which was highlighted by one of the students:

'The sessions are okay, but sometimes I can't link between the PBL topics and lectures' (RJ2/case8).

Some students considered the size of the group to be large, which made the sessions very noisy and led to a lack of coordination:

'The group is big and noisy. Fewer students in the group would be better' (RJ1/case6).

'Sometimes I feel uncomfortable and confused because of too much noise by the girls' (RJ2/case8).

'The group is large' (RJ1/case12).

The issue of group size was kept in mind before starting the research. There was a solution, which was to divide students into groups of five or six. But that required having more than one facilitator, and that was not possible. The researcher was concerned with carrying out the sessions for each group in the same manner. Including more than one facilitator might lead to differences in the way the sessions are implemented. As s result, students' feedback will differentiate according to each facilitator's way of leading the session. This will affect the consistency of the data.

Students commented on the paperwork required with the intervention. The researcher suggests they considered this as a problem because they already had other coursework. Therefore, since the assignments included with the intervention were extra work, it applied pressure on them:

'We have some paperwork which requires time from us' (RJ1/case18).

'The homework put pressure on us' (End of semester RJ/case17).

Students provided some suggestions. They suggested using videos and bringing their laptops to the class. One student suggested preparing a room with computers and internet facilities to allow students to search for required information on the internet during the sessions instead of waiting until going home. Both suggestions were reasonable, but there were difficulties in facilitating them. The nursing school has no wireless internet and the time was limited. Therefore, anything which required the internet was left to be done as an assignment and discussed in the following session. This was also a reason for being late in finishing the scenarios on time and feeling more pressure:

'Using videos with the PBL might be very helpful' (RJ1/case4).

'I suggest using the laptops' (RJ1/case3).

'PBL needs some more organisation and facilities such as a room supplied with internet facilities, so we can search together as a group. That will be faster and save time' (End of semester RJ/case14).

The research would suggest using videos to enhance learning through demonstrating to students how to manage emergency conditions and other deteriorating cases.

Another student suggested taking the scenarios with them to the clinical areas:

'I suggest applying the PBL to the clinical. Go to the hospital with the scenarios' (RJ1/case1).

The researcher supported that idea and students started to take the scenarios with them to the hospital and ask the nurses to help them. The RJ1/case1 reflection sheds light on a very important issue, which is incorporating PBL into clinical practice. This might improve students' learning and practical skills.

Another student suggested having a leader for each group who will take the responsibility of distributing the papers before the session in order to avoid wasting time, reduce noise, and enhance coordination:

'I would suggest having a group leader who will be responsible for distributing the papers prior to the PBL session, rather than wasting time. This person will control the group and be their representative' (RJ1/case1).

Another suggestion was receiving all the scenarios from the beginning of the semester and putting them into a folder. This might be similar to the idea of portfolios and was regarded as a good idea. But not all scenarios were ready. Some were modified after the researcher attended the lecture with students. So it was impossible to give the final versions of scenarios to students in a folder:

> 'I suggest distributing all the PBL papers from the beginning and arrange them as a folder. This will be better' (End of semester RJ/case3).

5.6.2. Effects on emotional wellbeing

It seems what was discussed earlier about students' perceptions of the lecturing approach had resulted in a negative effect on students' emotions. The first thing the researcher heard from most students (the intervention group and control group) when she met them before starting the research was:

> 'We are not happy, bored and depressed' (Field notes).

When students discussed their perceptions of the lecturing approach they provided reasons for them and how they affected their education:

> '... My grades are falling down – each year they are worse. Whenever I decided to get better I find myself becoming worse and I don't know why. Maybe my studying is not enough. Sometimes and actually most of time I get a feeling that I don't want to read a thing; I just sit and stare. I think it is a sign of depression because I didn't achieve what I want' (End of semester RJ/case4).

> '... This is very tiring. There is no consideration of our physical, mental and psychological abilities' (End of semester RJ/case9)

It might be suggested that students reached these levels of frustrations because they did not achieve what they expected. This made them lack interest in studying, and as a result their grades dropped. Furthermore, regarding students' lack of interest, the researcher observed that they hardly responded to the teacher, and they usually had side conversations. After half an hour of starting the lecture, 25% of them went outside and sometimes some of them did not appear again (Field notes). Students' lack of interest in lectures and escape were mentioned by one of the students:

'I can't sit in the class for more than one hour ...' (End of semester RJ/case9).

This behaviour is considered to be unacceptable from students. However, the researcher did not observe any response from the teachers towards that. This could be as a result of the large number of students, which made it difficult to notice students leaving the class without returning. Besides, students who escape were usually seated at the back of the class and left by the back door.

Students reported how the workload affected their personal life and made them isolated. They said that they do not have time for socialising and entertainment or even seeing their families:

'... We leave school at five or six. So when will we see our families? I don't see my mum and dad; I don't even join them for lunch or dinner ...' (End of semester RJ/case11).

'... I think I reached the stage of 'burn out'. Some kind of pressure might lead to good results but what we experience is not justified and haphazard pressure. This put me in a bad mood and unable to cope with the school and education. I had better results this semester but I ignored my social life. I stay for days without seeing my family. No time to socialise or contribute in any social activity. There

should be some coordination so we can be more productive' (End of semester RJ/case13).

'We cannot attend any activities outside the university. We should seek permission to go to the other building for lectures or anything else' (End of semester RJ/case17).

Case 17's reflection about the necessity to ask permission for any outdoor activities suggested that students might be not treated as mature individuals who are responsible for their behaviours. The researcher would consider this would have a negative effect on students' abilities of building their autonomy and becoming independent individuals. This might contribute to lack of confidence and affect their future career.

The effect of all the previously-mentioned factors on students' emotional wellbeing might also be aggravated by lack of support by the school itself. Above, case 9 mentioned that the college staff did not care about students' conditions. Actually students could not find anybody to talk to since their schedule was loaded and the teachers and teaching assistant left very early. The researcher observed that there as no interaction between the students and faculty members. After 2 pm only faculty members who have lectures would show; otherwise the building was very empty (Field notes). Students mentioned:

'There is no coffee shop in the building and the main cafeteria closes at 3 pm; whilst we stay until 5 pm. There is no support, no entertainment, and we don't feel we are in a real school. We feel isolated, nobody tells us about events in the university main campus' (Discussion group1).

Students' arguments justify the reason for being unhappy, bored, and depressed. The researcher would suggest that the sessions of the PBL elements being held at the end of the day was one reason, plus their assignments had also applied more pressure.

5.6.3. Learning outcome

Students reported that five important outcomes occurred with the intervention, which are:

- Communication skills

- Improvements of grades and performances

- Linking theory to practice

- Enhanced thinking and analysing

- Greater participating in the learning process

Every single outcome was identified as a separate subtheme but it was found that all are related to each other and highlight one issue, which is the intervention learning outcome. Therefore, it was decided to bring them together and discuss them under one title, which is learning outcome.

5.6.3.1. Communication skills

It was obvious that the intervention group participants generated personal growth. They improved their communication skills, they exchanged information, they started to express their opinions freely, and discuss with the group. Examples of students' comments are:

'I learned how to communicate with the others' (RJ2/case6).

'With PBL I learned debates and discussion' (End of semester RJ/case8).

'Students listen to each other, discuss together and explain their point of view even when it was wrong' (End of semester RJ/case15).

'There was a freedom of discussion. Students were encouraged to talk and we were given the chance to express our opinions' (RJ1/case1).

The quotes below indicate that encouraging students' communication through facilitating discussion between students allows for sharing information and increasing students' knowledge:

'The advantages of this session are sharing learning and experience, discussion, and gaining new information' (RJ1/case16).

'We work as team ... exchange knowledge' (RJ1/case19).

'... I benefited a lot because we discuss together and everyone contributes with what she knows' (End of semester RJ/case11).

Students also mentioned another two important outcomes of the intervention, which are respecting others and patience. This might be a result of continuous discussion during the sessions, where students are required to listen to their colleagues' opinions to be able to come up with a solution to the problem presented in the scenarios:

'I learned to deal with people, listen to them, and respect their opinions' (RJ1/case4).

'I learned how to respect the others and communicate with them' (RJ2/case8).

'I learned patience' (RJ1/case6).

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It is clear that with the traditional lecturing approach students did not have the chance to experience the above-mentioned skills due to many reasons: with lecturing there is no chance to discuss because teachers are concentrating on finishing the contents of the lectures in the allocated class time. What was observed is that the teachers rush to the class room and immediately turn on the projector and start teaching without any kind of communication with the students. They are only concerned with finishing on time (Field notes). In addition, students concentrate on writing what has been said by the teacher and copying every single word written in the slides. There is little opportunity to engage in discussion, question or reflect on the information mentioned, even if it was not well understood. It is suggested that the teachers failed to interact with groups. This has resulted in a lack of participation, and students being passive recipients. Examples of students' comments which could be seen as a factor of lack of communication are:

'... They don't ask students to participate. There is no encouragement' (End of semester RJ/case6)

'During the lecture we concentrate in writing what has been said by the teacher rather than understanding' (End of semester RJ/case12).

It is not only about the way lectures are conducted but also the lecture time itself. Holding lectures at the end of the day can be considered as a big factor for hindering students' communication. Students mentioned that they attend classes after being subjected to long hours of clinical training. They start the clinical practice at 8 am and then they have to return to the college at 1 pm having a break for one hour. After that, they start their classes at 2 pm until 4 pm. This has resulted in them being less energetic, and less interested in contributing in the class. One student said:

'The day is very long, we return home at 4 pm. Not only that but also we spend long hours in the hospital. We return to the college very tired and we have to attend lectures. How can we concentrate? Most of the girls are sleepy and some are already sleeping' (End of semester RJ/case11).

It is possible that another reason for the lack of the above-mentioned communication skill is the culture where the students have been raised. Saudi culture considers teachers as high authority; they are in a position of being right and students do not have the power to correct them or discuss with them since this will be considered as showing lack of respect. As a result, students feel hesitant to discuss their concerns with the teacher freely, and teachers will consider students' reflecting or asking for information as not showing accepted behaviour. This can be illustrated from that mentioned previously by one of the students when she tried to correct the information mentioned by the teacher from an old edition book:

'The teacher said "I don't care about the book you have at home. Just listen to what I say"' (End of semester RJ/case17).

The apparent improvement in students' communication skills after being subjected to the intervention of the PBL elements would be as a result of this strategy of encouraging students to question, discuss, analyse, and reflect on problems presented in scenarios as a group. Students became active rather than passive recipients and they communicated with each other more frequently. At the beginning of the semester, it was observed that some of the students were very quiet and isolated during the session. The researcher remembers one student was hiding behind her colleague when she started to ask questions. However, by the end of the semester these students changed. They became more active and started to interact with their group members. The researcher actually started to hear their voices (Field notes).

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It is possible that the effect of the intervention on developing students' communication skills has contributed to an important outcome which is improving students' self-confidence. One student said:

'... I became more confident ... now I can go and ask. In the last years I was not talking with anyone. I actually was afraid of people in general' (End of semester RJ/case15).

She also gave an example saying:

'... I never provided a presentation like the last time ... I became better ... I have more confidence in myself' (End of semester RJ/case15).

Other students mentioned:

'The nicest thing about PBL is the discussion and stories. We give our presentations without fear of being right or wrong' (End of semester RJ/case8).

'I learned how to argue and engage in discussion without feeling shy' (End of semester RJ/case8).

'I was able to talk freely and answer questions' (RJ2/case7).

'The programme gave me confidence and improved my self-esteem' (End of semester RJ/case5).

Students' engagement in the learning process and their interaction with their colleagues can be considered as another strong reason for enhancing students' personal growth in terms of self-confidence.

Good communication skills and self-confidence are very important learning components within the clinical practice area. Students need to be observing, questioning, and searching for the required information. Those factors require proper communication with the professional health team, patients, and relatives. Students are expected to gather data about patients' history through asking, listening carefully and then summarising what has been said and reflecting on it. There are pre-designed documents where students can write their observations. I had a discussion with the students about the way they perceive the clinical settings. They said:

> 'We have difficulties in completing patients' charts and we feel shy to approach
>
> patient and ask them about their condition' (Discussion group2).

This is a very serious outcome of lack of self-confidence and communication skills. Those two factors would affect students' future career; it is necessary to be able to listen to patients and collect history from them in order to figure out the problem and manage it. In addition, establishing good communication with patients and their relatives will reduce their anxiety. It can be argued that this short exposure to the intervention was insufficient to allow students to overcome this problem. In addition, students' previous suggestions to apply the intervention to the clinical area might help in overcoming this problem and increase students' confidence.

5.6.3.2. Improvements of grades and performances

Students perceived that, as a result of the intervention, their performance in exams and grades improved. Those reflections were at the end of the semester after the mid-term examinations and before receiving the whole semester's GPA. Which means the students did not have any knowledge of their grades and GPAs when they reflected on their performances:

> 'My grades are better ...' (End of semester RJ/case8).

'I did well in the exam' (RJ2/case4).

'... It was obvious that I had improved. My performance is better than the first and second year' (End of semester RJ/case12).

Students' reflections below suggested that the way the case scenarios prepared to discuss real cases, and their ability to allow students to recall previously-gained knowledge and use it alongside new knowledge, have resulted in increasing students' interest in subjects and strengthening their memorisation. Consequently, their performance in exams improved:

'... before I found studying to be boring. I study only important things. However now I can understand information and link them together' (End of semester RJ/case12).

'I remember what is taken in the PBL sessions ... Because we discuss cases and deal with them' (End of semester RJ/case10).

'... What I learned about diseases in scenarios will never be forgotten' (RJ2/case7).

'We need sessions like that because they will help us to remember information rather than forgetting it' (/RJ1case9).

Although students perceived their grades to have improved, the quantitative data indicated that there was no significant improvement in the intervention group grades after implementing the PBL elements (pre-test =3.55, and post-test=3.57, p=0.676). Only a slight increase was detected. Students perceived the intervention to have increased their knowledge. In addition, it reduced the effort and time they spent in studying, as opposed to what

happened with lecturing when they mentioned they had to study for days in order to be able to obtain good marks:

'I felt that I have knowledge' (RJ2/case2).

'... I am learning more and more' (RJ2/case4).

'It saves time. It gives a lot of information in a short period of time' (RJ1/case11).

'I am happy because I collected a lot of information in a short period of time' (RJ1/case13).

The researcher considers the above reflections about the intervention reducing efforts to be surprising. It might be considered that the intervention requires additional work from the individual students and to add burdens on students through the time and effort required to work on scenarios. The following experts' reflection suggested that the above factors could make students more interested in studying:

'I think I am studying better ... We don't need to go back books again' (End of semester RJ/case 11).

'... Now I study easily' (RJ1case/18)

Furthermore, student's reflections suggested that preparing the case scenarios in a way that they link to the taught course topics was an important factor. This has allowed students to review what has been studied in the classroom and implement it to the scenarios which caused them to understand further what was discussed in lectures, memorise it, and then perform better in exams. This is pointed out in the reflections:

'... I am studying better because scenarios were linked to the course syllabus ...'
(End of semester RJ/case 11).

'I learned a lot about septic shock. That helped me in my studying and exam'
(RJ1/case9).

'I learned more information related to my lectures in a simple way' (RJ2/case8).

Through discussing with students, the researcher found that the intervention has widened students' imagination and caused them to properly use their memory and knowledge to answer exam questions. This could be one of the reasons for students saying that their grades and performance are improved:

> 'Some of the exam questions are similar to what was discussed in some of the
>
> PBL sessions. During the exam I observed I became more relaxed I just started to
>
> imagine how we managed the cases in the PBL scenarios and used that to answer
>
> the questions. Before, I just tried to squeeze my head and write down what I
>
> memorised from the handouts (Discussion group2).

Working on the problems presented in the scenarios can be seen as an important reason for enhancing students' memorisation and performance. Taking part in analysing scenarios, and coming up with a diagnosis and treatment might increase students' understanding to the presented medical condition. In addition, since they worked on that on their own they would not forget it. Students said:

> '... Scenarios made me understand diseases better. I learned how to come up with
>
> a diagnosis from the clinical manifestations, and manage the disease and patient'
>
> (RJ1/case4).

'I was able to discover the diagnosis within a short period of time and I helped my group' (RJ1/case13).

Students' reflections suggested that the intervention enhanced students' communication skills through group work, discussion and interaction, which had resulted in improving their learning and performance through exchanging information between each other. Students became eager to learn and consequently their level of understanding and memorisation improved:

'I learned by discussion' (RJ1/case11).

'We share information between each other' (RJ2/case8).

'I was sharing the information with all the girls ...' (RJ1/case3).

'We discussed the signs and symptoms together ... distribute questions between each other ... I feel I have too much information that I will never forget' (RJ1case5).

'... we work and think together; I became more eager to learn.' (End of semester RJ/case9).

The student below described how discussion helped her to learn about caring for patients with renal failure:

'I learned more about renal failure and caring of patients ... I learned that from the discussion' (RJ1/case20).

The following students' comments suggested that discussion will raise questions which will change students' way of thinking into what can be referred to as the 'questioning mind' where the students ask questions and try to find their answers. This could improve students' learning. When a person knows why things happened and how, he or she will learn them more easily than just receiving a piece of information to remember and write down on the exam paper:

> 'Discussion, debate, and questions made me understand more than with routine lectures' (End of semester RJ/case11).

Another student said that the intervention has increased her confidence in her knowledge. This can be seen as an important outcome that will positively affect students' performance in exams:

> '... I became more confident about my knowledge' (RJ1/case17).

5.6.3.3. Linking theory to practice

Students highlighted the issue of the theory practice gap. They found that lectures were not providing the chance to link what was taught in the class to what was seen in the hospital:

> 'No link between lectures and the hospital cases' (End of semester RJ/case2).

> 'Before, we felt patients' cases in the hospital bore no relation to what was mentioned in the books ...' (End of semester RJ/case14).

Maybe this is because teachers were not using examples from the hospital. A student said:

> 'If there was something that had relation to clinical the girls would be more motivated ...' (End of semester RJ/case15).

This is different from the intervention, which depends on using patients' cases to allow students to imagine and apply solutions. It also encourages students to recall similar cases seen in the clinical settings and discuss them with the group. Students considered the theory practice gap as a factor in them feeling unprepared to practise in the hospital. One student said:

> '... My clinical skills are very bad. When we go to the hospital and I am asked to do any work, I find myself standing and unable to do anything. Although I know most of what I was told, I don't know why that happened to me. Is it because of lack of confidence or because our teachers concentrate on knowledge and ignore the practical part? I don't want to blame the university for my poor skills and performance, but I still can't ignore that if there was better coordination in our education within the university I would have better performance or at least I will know how to improve myself. Most of our teachers have good experience we can learn from but, due to lack of time, coordination and management, they are just concerned with providing us with the lectures in their specific time without concentrating on the practical skills' (End of semester RJ/case13).

Case 13's reflection suggested that students' poor clinical skills would be as a result of the teachers' emphasising attention on the theory and ignoring the practical skills. In addition, there were no attempts to teach students how to implement what is taught in the class within the clinical setting, which can be referred to as linking theory and practice. The lack of education coordination, which is seen as an administrative problem, nevertheless has a direct impact on learning.

Students' clinical performance was also highlighted by one of the hospitals' head nurses. The researcher arranged to attend the clinical with the students and had a discussion with her. The head nurse said:

> 'I rarely find students who are eager to work with nurses or even to ask them any information. Sometimes it happened that we had a patient in the ICU with clinical signs and symptoms that I am sure they studied in the school. When I asked the students about the clinical presentation and how it should be treated they would just stand silent without answering' (Hospital head nurse/Field notes).

The above head nurse observed that most students are not interested in practising or learning. This could not only be as a result of the students' poor clinical skills. There might be other factors such as lack of confidence, or maybe students' lack of satisfaction, which reduces their motivation to practice.

The interesting thing is that when students reflected on their experience with the intervention they said that the scenarios allowed them to link between the clinical cases and theoretical materials. That would facilitate more understanding:

> 'Before, we felt patients' cases in the hospital have no relation to what was mentioned in books. However, with PBL I can link the case in the scenario to the theory ...' (End of semester RJ/case14).

> 'I like the way we link the circumstances in the scenario together. This allowed me to link real-life situations with the theory and the huge amount of information we take in' (End of semester RJ/case17).

Furthermore, one student's earlier suggestion of taking the scenarios to the hospital had helped in facilitating linking theory to practice. One of the students highlighted that in her reflection:

> 'It was very interesting, especially because the session about renal failure was in the dialysis unit week' (RJ1/case20).

The above quotes suggest that using case scenarios which include reality stories about patients will encourage students to think about the problem, analyse it, and try to find solutions for it. This will enhance students' abilities to link between what they learned in theory to what they will see in practice; especially if the cases discussed were similar to the ones seen in the hospital. In addition, students' interest and confidence to practice will be enhanced. As a result, their practical skills might improve. This also supported students' previous suggestion, which was about taking the scenarios into the clinical setting. This might encourage the student to look for similar cases. Once they find one they will look for the management protocol in the patient's file that will encourage their understanding. Besides, it will help them to link theory with practice, and it will improve their clinical skills because they were able to see the case and observe how it was managed.

5.6.3.4. Enhanced thinking, analysing, and systematicity

Students complained about the presentation of lectures in that they were only being read from the slides without any interaction between them and the teacher. They found that they perceived the intervention to develop their thinking and analysing abilities. They were able to analyse details presented in scenarios and find out what they contribute to:

'The PBL is a good idea; it makes us work our mind. In the lectures we don't use our brain; we don't link things together and come up with inferences. PBL is very useful. ...' (End of semester RJ/case14).

'... My thinking is deeper and wider ...' (End of semester RJ/case8).

'... I started to link information together; my way of thinking had changed ...' (End of semester RJ/case2).

'I learned how to analyse information with logical thinking' (RJ1/case9).

'I tried to figure out what is going on in the scenarios and find answers to it' (RJ1/case3).

'We explore what can we do and think critically' (RJ1/case8).

Case 2 perceptions suggested that thinking is a consequence of a previously-mentioned outcome, which is students being able to link what is studied and discussed in the sessions to previously gained knowledge as well as practice. Students mentioned how they learned to use their thinking and analyse information. End of semester RJ/case14 differentiated between the intervention and lectures. She addressed a very important point, which is that, with lectures, they do not think and estimate conclusions. In addition, RJ1/case3 suggested that the intervention helps students to know how problems happened, why, and decide how to manage them. This will enhance students' thinking and learning.

A student mentioned in her reflection that the intervention allowed her to organise information; it seems this was linked to what was said above by case 3 about how the intervention enabled her to know how and why problems occurred and decide how to manage

them. It is worth mentioning that, whilst doing that, students were guided by predesigned questions referred to as a 'trigger guide' to solve the case problem systematically. Therefore, it can be argued that learning how to solve scenario problems by figuring how and why they happened and how to manage them, in addition to using the trigger guide, might be a reason for students perceiving that they had become more organised:

'I learned how to organise the information' (RJ2/case9).

These data (above) suggest that the process of thinking and analysing and other learning outcomes are linked to each other. If students realise that they are able to think, analyse and imagine, this will strengthen their self-confidence. As a result, accordingly their clinical skills will improve because they will practise and function without any fears. This is in contrast to what was happening with the lecturing approach when they argued that they stand and stare without being able to do anything because they do not know or they are afraid.

5.6.3.5. Great participating in the learning process

The lecturing approach was described earlier by students as a way of finishing a number of slides. They said that they sit in the class trying to listen and write down every single word said by the teacher and then end up with no concentration. They implied that they had no role in the class. However, with the intervention, students highlighted the way they were involved. They liked being independent, looking for the required information, and not relying on the teacher to 'spoon feed' them the information. Students argued:

'I like self work' (RJ1/case6).

'I like working on my own. Searching for information on the internet made information stick in my head' (RJ1/case4).

'... I like the idea of PBL because I participate in sessions. Then, go and look for

the information on my own' (End of semester RJ/case1).

Students concluded that, when they had a role such as searching books and the internet, or discussing within the group and giving their opinion, this resulted in them being able to form a strong knowledge base leading to a sense of knowledge retention: 'information sticks in my head'. As a result they should perform better in exams. This rationalised students' satisfaction with the intervention. It seems being a part of the learning process increased students' keenness to learn and caused them to like the subject and feel that they had deeply understood it. This has affected their feelings and confidence because they decide how and when they learn and what the things they need to know are. In addition, students' participation in learning facilitated their communication with each other, increased their confidence, and maybe reduced their tension and anxiety and consequently improved their clinical skills.

5.6.4. Assessment methods

Students demonstrated dissatisfaction with the assessment methods used in the school. They were not happy with the design of the examination papers, the criteria for answering exam questions, and the evaluation of their clinical skills. They reported that examinations are in the form of multiple choice questions which they think might affect their performance:

'... examinations are the only thing that judge students' future. They are all in the

form of multiple choice questions' (End of semester RJ/case3).

In addition, they said that teachers depended on memorisation to mark examination papers, suggesting that they assess memory, not understanding. Teachers actually prepare the answer key to the exams and evaluation criteria and, based on that, the students will be assessed.

Answers are copied from the handouts and text books. This is the college system. There was no chance to take a copy of these evaluation criteria since it was not allowed and findings here are based on student reflective journals:

'Answers should be copied and pasted. They don't accept us writing what we understand' (End of semester RJ/case6).

Students described this as an unfair way of treating them because those who use their understanding to answer usually receive less marks than those who memorise every single word in books and handouts and write it down in the examination paper. They had given examples as follows:

'Students who use their understandings to answer questions ended up with receiving less marks than those who wrote what they memorise' (End of semester RJ/case15).

'... I feel discrimination, especially in the way of correcting exams and giving grades. Because I discovered that correcting exams depends on the effort of being able to memorise rather than thinking and understanding ... it seems that teachers are not reading our answers they just search for words which are similar to the books words. As a result, we lose our marks; this is unfair' (End of semester RJ/case 17).

'Getting good marks does not exceed being only a dream. I study very well and the result is that I leave the exams very happy and sure from my answers. But, in the end I discovered that I had bad marks, not matching my answers' (End of semester RJ/case9).

Students also mentioned the clinical marking; they argued that teachers applied limits to the marks students can receive. They said that even when they have excellent clinical performance, no-one will receive an A:

> '... when they evaluate us in the clinical, the maximum grade you can get in the clinical is 13.5 out of 15. Their excuse is that no-one is perfect to take a full mark ... They compare us with the staff nurses who have experience and more knowledge' (End of semester RJ/case1).

I would agree with the staff on this point since no student is 100% skilful. There should be still a lot to learn in practice and there must be some areas of weaknesses.

They also said that teachers are not capable of evaluating them since they do not supervise them in the hospital:

> '... we stay in the wards alone; nobody checks on us and they don't know what we do. So how do they evaluate us, based on what ...' (End of semester RJ/case17).

5.6.5. Reflection on the clinical practice

The majority of the students argued that with lecturing they were gaining knowledge but no practical skills. They said in the hospital they feel as if they did not learn anything; they do not even know the basic skills:

> '... we will graduate from university with knowledge but no skills ...' (End of semester RJ/case17).

'We don't know the basics. In front of the patients I know nothing' (Discussion group1).

'Nursing is only on paper; nothing else' (End of semester RJ/case3).

Here the issue of the theory practice gap might have a major effect, since students gather knowledge but they do not learn how to apply it in practice. Students mentioned that teachers are not concerned with their lack of practical skills:

'They focus on attendance and it is just taking a history from patients rather than learning more skills' (End of semester RJ/case6).

In addition, they mentioned that they were rarely supervised by their teachers:

'... my colleagues just sit on the nurses' stations doing nothing, because our doctors are not available to supervise them' (End of semester RJ/case17).

Students highlighted the issue of the age gap between them and their supervisors. They perceived teachers' seniority as one of the factors in them not being supervised in the practice setting and suggested having younger instructors who are willing to spend time with them in the practice area:

'... we need young instructors and teachers who can teach and supervise us in the hospital' (End of semester RJ/case10).

Students' reflection suggests that the issue of being physically capable to supervise and work with the students in the clinical practice is important. Practice requires standing for a long time and sometimes doing nursing activities such as turning patients. Furthermore, from the above reflections it might be argued that students need instructors who are near to their age so they can understand their needs and situations.

Another issue mentioned was that teachers have limited clinical skills:

'... they do not do any clinical work. As a result, they have forgotten a lot of information and most of their clinical skills ...' (End of semester RJ/case6).

'Our doctors do not have the challenge to practise and work like hospital nurses; they just stand up and ask questions and give marks' (End of semester RJ/case7).

Students' comments shed light on the importance of engaging hospital staff in training nursing students since they have better up-to-date clinical skills. Lack of this influence could contribute to poor clinical performance by students. This initially will result from lack of supervision, and lack of teachers' updated clinical skills. In addition, it seems that the intervention had opened students' eyes on a lot of things. It has facilitated the questioning of the structure, system and practice. This could be as a result of skills gained knowledge from the intervention such as self-confidence, negotiating, communicating, and thinking and analysing.

It can be concluded that what has been mentioned earlier including dissatisfactions with the system, the learning process, evaluation methods and clinical practice, as well as the workload applied on students have resulted in negative outcomes. This includes lack of concentration, lack of interest in education, poor grades and clinical performance, and at the end depression and frustration. Those outcomes are considered to be very serious; they could affect students' entire life and future career confidence and performance. However, it is clear that using the intervention to enhance the traditional teaching has had a positive effect on students both educationally and personally. Students were happy, had better performance in exams, and they started to regain their self-confidence.

5.7. Conclusion

This chapter has enriched this study with detailed information about students' perceptions of their learning experience with the traditional teaching methods and the implementation of the PBL elements as an additional approach. In addition, it has given detailed information about students' views of their learning environment in general, either in terms of discussing the quality of theoretical and clinical teaching the students receive, or other important aspects of their learning experience, such as learning outcome, their perception of their clinical practice, and assessment methods used in the college. The findings suggested that the themes identified from students' qualitative data are related to each other. Each theme will contribute to the other one starting from the learning process and how it is applied and how this affects students' learning outcome to their clinical performance, personal growth, and satisfaction in terms of its effect on students' psychological condition. The next chapter is the integration chapter, where quantitative and qualitative data will be integrated together to explore the quantitative finding, and identify whether data collected from both methodological approaches are agreeing or disagreeing with each other.

Chapter 6: Integrating quantitative and qualitative data together

6.1. Introduction

In this chapter, the quantitative aspect will be investigated based on the qualitative findings. Moreover, similarities or divergences between different data sets will be identified.

6.2. The intervention and control groups' performance in the CCTDI before and after the intervention

The quantitative data show that the intervention and control groups were both low in critical thinking dispositions at the first time of administering the CCTDI, before the intervention. Students' reflective journals explained this by suggesting that the lack of critical thinking skills for both groups in the pre-test was a consequence of the traditional teaching approach. This strategy was described as a way of teaching where there was a lack of students' participation in their learning process, and a lack of interaction between students and their teachers. This strategy was hindering students' thinking instead of encouraging it. Students did not have the chance of discussing, asking and reflecting. That was mentioned in students' reflection on the lecturing approach:

'... They don't ask students to participate. There is no encouragement' (End of semester RJ/case6)

Another reason for lack of critical thinking skills from the qualitative findings is that lectures are held at the end of the day when students are tired after long hours in the hospital. That did not promote participation and thinking:

'The day is very long, we return home at 4 pm. Not only that but also we spend long hours in the hospital. We return to the college very tired and we have to

attend lectures; how will we concentrate? Most of the girls are sleepy and some are already sleeping' (End of semester RJ/case11)

The quantitative data showed that the intervention group's dispositions towards critical thinking after the intervention of the PBL elements had significantly improved. However, the control group remained at the same level. When both groups' critical thinking disposition scores were compared, there was no significant difference between the two groups in the pre-test results. However, the post-test scores indicated that the intervention group has a significantly higher result than the control group.

The intervention group's perceptions of their critical thinking abilities were described in their reflective journals. The group perceived that improvements had been made. This supported the result of the post-test CCTDI and suggested that the intervention improved the students' thinking through giving them the chance to think deeper and wider as per students' claims:

'… My thinking is deeper and wider …' (End of semester RJ/case8).

This approach allowed them to change from being passive recipients, not participating as mentioned above, to being able to use their thinking to analyse problems presented in the case scenarios. Subsequently, this allowed students to explore materials and texts and begin to problem solve for themselves:

'I learned how to analyse information with logical thinking' (RJ1/case9).

When the intervention group pre-test subscale scores were compared to those of the post-test, it was found that the intervention group showed significantly higher results at the following

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post-test subscales: truth-seeking; systematicity; and confidence. The qualitative and quantitative findings agreed with each other in this aspect.

According to the reflective journals, the truth-seeking trait was improved due to the intervention allowing students to search for what is happening in the presented case in the scenarios on their own; this increased students' keenness to look for the facts:

'I tried to figure out what is going on in the scenarios and find answers to it' (RJ1/case3).

'We explore what can we do … (RJ1/case8).

Confidence improvement was also highlighted in students' reflections. They found themselves to be more confident to interact with people and ask questions, as seen in the following reflections:

'… I became more confident … now I can go and ask …,' (End of semester RJ/case15).

'… I became better … I have more confidence in myself" (End of semester RJ/case15).

The qualitative data related this outcome to the effect of intervention on students' communication abilities. It was claimed that discussing with the others had increased students' confidence:

'I learned how to argue and engage in discussion without feeling shy' (End of semester RJ/case8).

Furthermore, the reflection below suggested that the intervention had helped the students to organise their information and as a result it can be said that systematicity scores increased:

'I learned how to organise the information' (RJ2/case9).

When the intervention group's post-subscales' result was compared with the control group, it was found that the intervention group obtained higher scores than the control group in the following subscales: analyticity; inquisitiveness; and maturity. The qualitative findings also agreed with what was found in the quantitative findings for those aspects.

Students reported that the intervention had encouraged them to use their thinking to analyse information which might have enhanced their analytic abilities and helped them to obtain higher scores in the analyticity subscale:

'I learned how to analyse information with logical thinking' (RJ1/case9).

The quantitative findings agreed with the qualitative ones on the development of the intervention group's scores in the inquisitiveness subscale. Inquisitiveness means students' keenness to learn and that was mentioned in students' reflections:

'We work and think together. This made me more eager to learn' (End of semester RJ/case 9).

'I like the idea of PBL because I participate in sessions. Then, go and look for the information on my own' (End of semester RJ/case 1).

In addition, the quantitative and qualitative data agree with each other on the positive effect of the intervention on students' maturity of judgement. This trait might be developed due to students' enhanced communication skills through group work. Students mentioned that they

learned how to listen to the others, respect their opinions, and they learned patience. The development of these behaviours might contribute to students evaluating different opinions and solutions. This will reflect enhanced maturity of judgement:

> 'I learned to deal with people, listen to them, and respect their opinions' (RJ1/case4).

> 'I learned patience' (RJ1/case6).

6.3. Differences in academic performance between the intervention group and control group

The paired sample t-test did not show any statistically significant differences between the pre- and post-test GPAs for each group separately. However, a slight improvement was seen in the intervention group post-test GPA, which can be considered as a non-change. On the other hand, the control group had slightly dropped their GPAs.

The intervention group's GPAs' remaining the same was a different finding from what students observed about their performances in exams. Students perceived their exam performance to be better:

> 'My grades are better ...' (End of semester RJ/case8).

> '... It was obvious that I had improved. My performance is better than the first and second year' (End of semester RJ/case12).

Students were not aware of their GPAs when their perceptions were gathered.

The qualitative findings on this aspect can be used to explore why the intervention group's performances remained the same without decreasing, which is what happened with the

control group. As per the below reflection, the intervention of the PBL elements made learning more interesting. In addition, it allows students to link previously-gained knowledge with new knowledge:

'... before I found studying to be boring. I study only important things. However, now I can understand information and link them together' (End of semester RJ/case12).

This might have enriched the students' store of information, and consequently positively affected their grades:

'I felt that I have knowledge' (RJ2/case2).

'... I am learning more and more' (RJ2/case4).

'It saves time. It gives a lot of information in a short period of time' (RJ1/case11).

The improvement in students' performance might also be as a result of the groups' discussion. This might allow for exchanging information with the group members, which has increased students' information and knowledge:

'We share information between each other' (RJ2/case8).

'I learned more about renal failure and caring of patients ... I learned that from the discussion' (RJ1/case20).

Enhanced knowledge and memorisation might be also as a result of the way case scenarios were specifically prepared to complement the course syllabus:

'... I am studying better because scenarios were linked to the course syllabus ...' (End of semester RJ/case 11).

The intervention widened students' imagination and this allowed students to use their memory and knowledge to answer examination papers. In addition, increased self-confidence, as seen in the quantitative data, could be another reason for better performance since it caused students to be less anxious and more relaxed during the exam:

> '... During the exam I observed I became more relaxed. I just started to imagine how we managed the cases in the PBL scenarios and used that to answer the questions. Before, I just tried to squeeze my head and write down what I memorised from the handouts' (Discussion group2).

6.4. Conclusion

In conclusion, it can be said that the majority of the quantitative data and qualitative data are related to each other. The qualitative findings supported the quantitative ones and gave reason for their occurrence. The next chapter will discuss the findings of this study in the light of relevant literature. Then, a general conclusion for the thesis will be given, followed by addressing its limitations, and providing recommendations based on the findings.

Chapter 7: Discussion and conclusion

7.1. Introduction

This chapter will discuss significant issues raised from the quantitative and qualitative findings, and highlight the implications of this study to the future of nurse education in Saudi Arabia. First, it seems sensible to remind the reader of the research questions and discuss the limitations of the study.

The discussion in this chapter is based on the following previously-addressed questions, which are here placed into a broader context by considering the published literature.

1. Is there any difference between students' dispositions towards critical thinking before and after introducing the PBL elements to their traditional course?

2. Is there any difference in students' academic performance before and after introducing the PBL elements to their traditional course?

3. Does introducing the PBL elements as an additional learning approach improve nursing students' critical thinking dispositions?

4. Is there a difference between the critical thinking dispositions of students who experienced the PBL elements and traditional education, compared to those who experienced only traditional education?

5. Do variables such as cultural background, age, and previous experience affect nursing students' dispositions towards critical thinking?

6. What are nursing students' perceptions of incorporating the PBL elements in their traditional course over one semester?

7.2. Limitations

The main limitation of this study was a relatively small sample size. For this reason, the findings of the quantitative data alone cannot be generalised to a broader community and the validity might be affected. However, the effect of this limitation might be reduced by adopting the mixed methods design.

The study targeted third-year nursing students who are studying critical care nursing. The course was taught over one semester and therefore the study was conducted in this period. One semester period might not be enough for monitoring the effect of the intervention of the PBL elements, and assessing differences between introducing this approach to the critical care nursing course and the traditional teaching approach alone. A longitudinal study over one year or longer would provide more extensive and reliable data. In addition, students' development can be detected more precisely with a longitudinal study. However, longitudinal studies might have some problems. This design is time-consuming (Bowling, 2002). Therefore, since the researcher was concerned with the time issue, using this design might not be applicable. The course length was three months, and the researcher could not commence her study immediately. She was targeting a specific group of students who study a specific course. The course was taught in the second semester. As a result, she had to wait for four months from the end of October 2008 until the end of February 2009, instead of conducting the research immediately. Another issue with longitudinal studies might be loss of participants, which could affect the sample size and reduce the chance of obtaining statistically significant findings (Bass et al., 1993). However, this might not happen in this study since students will be followed during their school year.

In this study, there were no statistically significant differences between the intervention and control groups' grades and GPAs. This could result from the presence of 'cross contamination' between the control and intervention groups. The intervention group might have exchanged the materials of the intervention (the PBL elements) with the members of the control group. This might have influenced the study results in terms of the effect of the intervention on grades and GPAs. Torgerson (2001) said that contamination decreases the effect size. In addition, 'it decreases the point estimate of intervention effectiveness' (p.355). Consequently, this might result in a type-II error. The issue of contamination might be solved by recruiting more participants, and by performing cluster randomisation instead of individual randomisation, as mentioned earlier (Torgerson, 2001; Puffer et al., 2005). However, in this study, cluster randomisation was impossible to perform due to the small sample size issue. Recruiting more subjects was not applicable, because the study was targeting a specific group: third-year nursing students studying the Adult Medical Surgical Nursing II course. Furthermore, in the context of a PhD, conducting a cluster trial might be beyond the resources since this might require additional organisations/institutions.

Finally, in this study, the students were encouraged to self-report their perceptions of introducing the intervention of the PBL elements to their course and other teaching methods they experienced. This might result in bias, in which students might be influenced by the novelty of the intervention since it is a novel approach different from routine lectures (Cooke & Moyle, 2002). In addition, students' culture might affect their perceptions of the intervention; students might avoid mentioning any negative comments about implementing the PBL elements as a result of being concerned with being friendly with the researcher, and to avoid causing any embarrassment. They might only write what, in their opinion, will please the researcher and what they think she would prefer to see in the journals (Williams et

al., 2007). This is common with graded reflective journals (Williams & Wessel, 2004). In this study, students were not graded for their reflections, since the main aim of that was to collect their perceptions. In addition, although in this study reflective journals provided extensive information, they demonstrated only the opinions of the intervention group. Therefore, it might have been useful to take into consideration the perceptions of the control group as well, to identify whether similar findings would have been shown under different educational circumstances. Another issue with reflective journals in this study might be around using a structured reflective journal with predesigned questions, to collect students' perceptions of intervention during the trial. According to Williams and Wessel (2004), students' level of reflection, and elements and aspects of the journal, might be affected by the directions given within the journal. In this study, this issue might exist in the first stage of reflection where students were asked to reflect on the intervention using structured reflective journals with questions such as what they learned and how they learned it. However, this might be compensated for by the after-trial reflective journals where no instructions given. In addition, all reflective journals were anonymous.

7.3. Critical thinking disposition of the intervention group and control group

In this study, the paired sample t-tests indicated that both groups scored low in the pre-test CCTDI; which means that both groups had low critical thinking dispositions. However, the post-test CCTDI result indicated that the intervention group had demonstrated significant elevation of their critical thinking disposition. They changed from scoring weak to being positive towards critical thinking. However, the control group did not show any significant elevation; they remained with low critical thinking dispositions.

The pre-test and post-test CCTDI performances of both groups were compared to each other. The pre-test result showed insignificant differences between the intervention and control group pre-test scores. However, the post-test scores indicated that the intervention group had significantly higher critical thinking dispositions than those of the control group. This study finding is congruent with previously-conducted studies (Yuan et al., 2008a; Ozturk et al., 2008; Tiwari et al., 2006a), where the effects of the PBL and traditional teaching methods have been contrasted.

Shin et al. (2006a) argued that a low critical thinking disposition score is related to the authoritative education style which stresses compliance with senior authority; instead of enhancing students' autonomy and independent thoughts. Another reason could be that the traditional teaching inhibits students' opportunity to contribute to their own learning: they do not have the chance to build up their own knowledge and improve their experience (Hsu, 2004). With PBL, a student plays different roles; s/he is a learner, a teacher, a member of a group, and a critical thinker (Wang et al., 2008). According to Wang et al. (2008) these multiple roles encourage students to become active and improve their critical thinking.

Discussion is considered to improve critical thinking (Johnson & Mighten, 2005). Tiwari et al. (2006a) viewed PBL as a strategy that facilitates critical thinking through the experience of a reflective, democratic group dynamic. In their opinion, group work enhances students' critical thinking through allowing them to experience different solutions for the event or problem, and then examine the effectiveness of each solution. With group work, critical thinking is developed through experiencing different challenging plans which are liable for alteration and modification (Maudsley & Strivens, 2000).

The paired sample t-test indicated that the intervention group had significantly improved in the following critical thinking disposition subscales: truth-seeking, systematicity, and confidence. Moreover, when the pre-test and post-test subscale scores of both groups were compared to each other, the result showed that the intervention group had significantly higher scores than the control group in analyticity, inquisitiveness and maturity. The improvement of these categories agrees with the findings of Ozturk et al. (2008) and Tiwari et al. (2006a). In Tiwari et al.'s (2006a) study, the PBL group significantly improved in the following subscales: truth-seeking, analyticity, confidence, and systematicity. In Ozturk et al.'s (2008) study, the PBL group showed significant improvement in open-mindedness and truth-seeking.

High truth-seeking scores are typical of students with a strong initiative to ask and to look for information, even if it does not agree with their previously held conceptions. Ozturk et al. (2008) related the development of this skill to the elements of PBL, encouraging students to develop the skills of questioning and information seeking. According to Colucciello (1997), truth-seeking will not be developed if students are not encouraged to examine their own knowledge and look for evidence on their own.

In the current study, it was observed that, even with significant improvements in truth-seeking for the intervention and control groups, the score for this subscale was the lowest between other subscales either in the first or second time of administering the CCTDI. Similar findings were demonstrated in the following studies: Zhang and Lambert (2008), Ozturk et al. (2008), Tiwari et al. (2006a), Day and Williams (2000), and Ip et al. (2000).

Low truth-seeking could be as result of students' lack of interest in searching for the truth and students preferring to have the 'authoritative right answer' from their teachers (Ip et al., 2000, p.88). In similar words, Zhang and Lambert (2008) considered that lack of encouraging independent learning and complete abeyance to the teacher's authority was another reason for low truth-seeking. In their study, Ip et al. (2000) related their findings to the authoritative educational culture of China. The Chinese educational culture was described by Zhang and Lambert (2008) as a culture where there is a lack of students' encouragement to ask questions. They related that to being worried that questioning the teacher would lead to embarrassment, if s/he were unable to answer questions asked by the students. This might be applicable to this study, and studies conducted by Ozturk et al. (2008) and Tiwari et al. (2006a). However, another reason might exist for Day and Williams's (2000) finding, since their study was conducted in Canada, which is a Western country where students are supposed to be more active, independent, and assertive (Ryan & Louie, 2007; Hsu, 2004). Therefore, in Day and Williams's (2000) study, low truth-seeking might be due to the characteristics of this generation of students. According to Ip et al. (2000), this generation of students are not interested in applying effort to their education as they prefer ready answers.

Teachers' authority might affect the development of truth-seeking (Zhang & Lambert, 2008). In the current study, students' reflections described how asking questions to the teacher to clarify things, discussing with her, or correcting her was not acceptable. In addition, this might be considered as showing disrespect. Therefore students' questioning abilities and motivation to search for information on their own is inhibited. Consequently, their truth-seeking abilities might be affected negatively.

Knowles et al. (1998) described the good educator by quoting the work of David L. Mackaye, which was published in the 1930s:

'A person is a good educator among adults when he has a definitive conviction about life and when he can present intelligent arguments on behalf of it; but primarily he does not qualify as an adult educator at all until he can exist in a group that collectively disputes, denies, and ridicules his conviction, and continues to adore him because he rejoices in them' (Mackaye, 1931, quoted in Knowles et al., 1998, p.42).

The intervention group in the current study also showed higher systematicity. According to Zhang and Lambert (2008), this means that, when solving problems, students apply an organised way of reasoning. Being organised was mentioned by participants in this study. This might be related to the use of a trigger guide, which consists of questions that help students to move from one step to another and become more structured through working in problems. Using this guide with every session might allow students to develop systematicity. This is supported by Tiwari et al. (2006a), who argued that:

'... with repeated practice of PBL, not only did students acquire the habit of thinking more critically, they also improved in some of the dimension of the construct' (p.552)

Celia and Gordon (2001) argued that group work facilitates social behaviours which are required for developing personal growth and communication skills. On a similar note, Jones (2008) said that PBL allows students to establish relationships and develop one of the communication skill aspects, which is confidence. This suggests that, in this study, the intervention group's high confidence might be as a result of the group work and interaction

with group members. Moreover, other factors might exist. In her study, Stern (1997) found that students realised that they had more knowledge and information than they had thought. She considered this to be a reason for students' feelings of confidence while working on problems. This was the same situation as in this study, where the intervention group participants perceived themselves learning more and having a lot of information, and being confident about their knowledge as expressed in the quotations in the qualitative analysis chapter, under the 'improvement of grades and performance' subtheme.

Stern (1997) considered confidence to be an important characteristic for nursing students. She considered that it enabled them to cope with different changing situations and fulfil their tasks more easily.

Maturity of judgement demonstrates students' abilities to reflect on and evaluate alternative solutions. According to Maudsley and Strivens (2000), group work develops judgement abilities. In the 1950s, Abercrombie applied group discussion activities for medical students and based on her findings she suggested that group work develops students' clinical judgements:

> 'Many factors of which we are unconscious influence our judgements ... It is postulated that we might make more valid judgements if we could become conscious of some of these factors. A situation (free discussion group) is described in which alternative judgements of the same stimulus pattern are discussed, and some of the factors influencing judgements became apparent. The validity of the various factors can be then assessed. ... judgement is improved after this experience' (Abercrombie, 1960, p.142).

With group work, students experience different interpretations and solutions for a problem, and then they evaluate the effectiveness of each one (Maulsday & Strivens, 2000). This means that students' decisions are based on examined and evaluated solutions. However, Shin et al. (2006a) argued that, with the traditional teaching approach, students acquire the habit of practising and managing situations according to what they have been told. They do not have the ability or chance to choose the appropriate decision based on the situation's consequences. This suggests that today's nurses' future career might be affected negatively, if the initiative undesired during training is subsequently expected in employment. They might not have the confidence of providing the best care in today's changing health care setting, where nurses' decision making is important (Ozturk et al., 2008).

The intervention group in this study demonstrated high inquisitiveness, which has been referred to as:

> 'The tendency to want to know things, even if they are not immediately or obviously useful at the moment. It is being curious and eager to acquire new knowledge and to learn the explanations for things even when the application of that new learning is not immediately apparent' (Facione & Facione, 2010, p.9).

It is worth noting that what is said about inquisitiveness in the above definition is similar to what students mentioned in their reflective journals. A student argued that they worked together, and through this she became more eager to learn. This reflection advocates that the development of students' inquisitiveness is related to both group work and independency. Group work might have increased students' commitments and sense of responsibility to look for the information on their own to complete the task assigned to them by their group leader. As a result, their inquisitiveness has increased. High inquisitiveness implies that students

have the tendency to develop their critical thinking and practical skills (Ip et al., 2000). This finding suggests that teaching needs to be modified in strategies that enhance inquisitiveness rather than an inactive teaching approach (Zhang & Lambert, 2008)

7.4. Differences in academic performance between the intervention group and control group

In this study there were no significant differences between the intervention and control groups' pre- and post-test GPAs, mid-term examinations and final examinations. This was similar to the findings of studies conducted by Lyons (2006), Beers (2005), Rideout et al. (2002), and Newman (1995). However, it is worth noting that the intervention group participants had slightly improved their performance whilst the control group performance worsened. Although this finding is not significant, it is worth exploring. According to Hwang and Kim (2006), PBL students become more motivated to learn and this is important for improving students' academic performance. Moreover, they argued that with PBL motivation to learn will result from students' satisfaction being increased as they learn independently. With PBL, learning from experience might have made the learning process easier than learning from text books (Jones, 2008). This is similar to this study's finding, as the intervention group students claimed that they studied more easily and were able to acquire a lot of information within a short time. Jones (2008) considered PBL to be a strategy that develops deeper knowledge. With PBL, working on scenarios allowed students to recall what they had learned previously; this might have increased knowledge retention and established what is referred to as a strong knowledge base (Cooke & Moyle, 2002). These factors might have allowed intervention group students to maintain their academic performance. With PBL, working in a group positively affects students' learning (Singaram, et al., 2008). In this study, students mentioned how discussion enhanced their memorisation. Moreover, in Cooke and

Moyle's (2002) study, students described how, with group work, they were able to learn from other colleagues' arguments. Similar to that, students in the Singaram et al. (2008) study perceived group work to be enabling them to understand difficult subject matters.

In this study, the students said that they studied better because the scenarios were linked to the course syllabus. This means that the PBL elements alone might not be enough to help students to synthesise knowledge. According to Arthur (2001), effective learning will be achieved if PBL and lectures are given together, not separately. PBL is effective if students have 'good' knowledge from a previous lecturing approach. This will allow them to have a broadened and deeper experience (Pitrik & Holzinger, 2002).

7.5. The relationship between students' demographic data and academic performance

This study examined the effect of students' demographic data on their academic performance. Both groups' examinations results (mid-term and final), and GPAs were gathered together. Then, using the one-way ANOVA test, the effect of demographic data on the students' performance was measured. The result showed that older and more experienced students showed better academic performance than younger students, who are less experienced academically and professionally. The literature provided many reasons for older students' better academic performance. Lederer (2007) argued that older experienced students could be more concerned with their academic achievements. Moreover, they have internal and 'vocational' motivations to learn (Richardson, 1995). Rigby et al. (1992) considered internal motivation to contribute to 'high-quality' learning. They viewed social environment and independence as factors playing an important role in developing internal motivation. In addition, Harper and Kember (1986) argued that life and work experiences increase self-awareness and maturity, which consequently affect individuals' way of studying. Referring to

Knowles's adult learning theory, it might be suggested that these mature students know why they need to learn, and learning is considered of great value for them, compared to younger students. In King Abdul Aziz University Nursing School, most of the experienced students are already working. They chose to continue with their education because that was a personal choice or because they were sent from their hospitals to complete a bachelor degree. This degree is required for professional development such as attaining a higher position or a better salary.

Age, life experiences, and maturity are considered to affect individuals' learning behaviours (Duff et al., 2004; Richardson, 1995; Harper & Kember, 1986). Older students' studying approach is seen as better than younger students; they tend to show 'deep' learning behaviours (Trueman & Hartley, 1996). Harper and Kember (1986) referred to young students as 'school leavers' and considered their learning approach as 'surface' learning. Trigwell and Prosser (1991) highlighted the qualitative variances between deep learning and surface learning approaches. They argued that a deep learning approach is associated with better understanding of the course, and reflecting 'high-quality learning' outcome. However, surface learning is associated with memorising and an increase in the quantity of knowledge, and reflecting a 'poor-quality' learning outcome. Their description might rationalise this study's older students' better academic performance.

The literature suggested that approaches to learn, namely deep learning and surface learning, are related to students' perceptions of their learning environment (Lizzio et al., 2002; Trigwell & Prosse, 1991; Entwistle & Tait, 1990; Entwistle & Ramsden, 1983). These studies concluded that deep learning is associated with positive perceptions of the learning environment such as 'good' teaching and clear course aims. On the other hand, surface

learning is associated with negative perceptions, namely demanding workload and inappropriate assessment procedures. The latter two aspects were mentioned by this study's intervention group's participants. Students demonstrated dissatisfaction with the traditional teaching approach. They perceived their learning experience as resulting in a heavy workload for them, due to hospital training, assignments, and examinations. In addition, they were not happy with their evaluation methods, which they describe as monitoring students' abilities to memorise rather than their abilities to understand. Assessment methods that monitor students' abilities of memory allow students to rote learn taught materials in order to write them in the assessment papers. This will help students to develop surface learning (Newble & Entwistle, 1986). The possibility of the presence of these contextual factors in this study could negatively affect younger students' learning strategies, leading them to adopt a surface learning approach and consequently have a lower learning outcome or academic performance than older students.

Another factor for younger students showing lower academic performance than older students might be the teaching style itself. Trigwell et al. (1999) found that a surface learning approach is associated with a teaching style which is teacher-centred, with a focus on knowledge transmission and making sure that students collect a good amount of notes about what has been said by the teacher, whilst providing less attention to the student-teacher relationship. These factors were mentioned by this current study's intervention group's participants. They said that there was not a flexible relationship between them and their teachers. In addition, teachers focus on knowledge quantity rather than quality. As a result, referring to the claim of Trigwell et al. (1999), it might be said that, in this study, another reason for younger students' lower academic performances is as a consequence of developing a surface learning approach due to a teacher-centred style with a focus on knowledge quantity

and quality; as well as the presence of other factors such as heavy workload and assessment methods. However, older students' age, experience, and maturity might have compensated for that, allowing them to be better academically.

Deep learning is developed when students are interested in learning and the teacher shows interest in and support for his/her students, in addition to allowing students to take control over their learning. On the other hand, surface learning might result if the evaluation methods are considered with the quantity of information students have. Moreover, surface learning is associated with anxiety and workload (Duff et al., 2004).

The opinion of Duff et al. (2004) provides further support to the earlier discussion about factors influencing older students' learning, such as internal motivation and social factors. These factors might have increased students' interest in learning and orientation towards their academic achievements, as mentioned by Lederer (2007). Richardson (1995) described how adults' experiences affect their learning positively. He argued that older learners themselves are a beneficial source of information. They can benefit from their experiences through combining them with present learning behaviours. Moreover, he further described how life experience improves learning through enabling older students to integrate, transmit, and modify previously-held concepts, meanings, and behaviours.

This study showed that parents' education has an effect on students' performance; those from less-educated families had higher grades than students from highly-educated families. A similar finding was reported in a study conducted by Menshawy (2010). This study examined the effect of parent's educational background, socio-economic level, and schooling on Egyptian students' academic achievements. The result indicated that students whose parents

have a lower level of education (intermediate school to first degree) had a better academic performance. Menshawy (2010) related this finding to the characteristics of the Egyptian society in which parents help their children to have better educational opportunities than themselves. This might substantiate this study's finding since both Saudi Arabia and Egypt are Arab countries whose societies might have a lot of similarities. Knowles et al. (2005) mentioned that adult students' motivation to learn comes from internal factors such as seeking better social conditions. Therefore, it might be suggested that students from families with lower educational levels have a strong motivation to improve themselves educationally, economical and socially. Consequently, they apply more effort into their education.

Education positively influences individuals' chance of getting a job (Egbo, 2000). It might be argued that highly-educated parents are more likely to be employed and have a higher income. According to Beyer (1995), parents' employment might not affect children's performance. However, in her opinion, what could have an effect is the experience of care, support, and providing attention to the development of children's cognitive abilities. Maqsud and Khalique (1991) said that a family atmosphere where there is support and motivation for students is important for educational achievements. In their opinion, families with a high socio-economic status might not have enough time to motivate and encourage their children; whilst families with lower socio-economic levels provide more support to their children. In Menshawy's (2010) study, students whose mother held a bachelor degree or postgraduate degree received less home care and support and showed poorer school performance compared to those whose mother had the same level of education but provided their children with more care and support.

This may explain how parents' education and lack of support affect their children's school achievements. In Saudi society, highly-educated parents might not have sufficient time to socialise with their children and encourage them, due to work responsibilities and pressure. This might negatively affect their children's performance.

7.6. The relationship between students' demographic data and critical thinking disposition

Another aim of this study was to identify whether students' demographic characteristics had an effect on their critical thinking disposition.

The quantitative data revealed that there was no statistically significant relationship between the pre- and post-test overall CCTDI scores and students' demographics. Statistically-significant relationships were found, however, between some of the subscale scores of the pre- and post-CCTDI and demographics. Age, and academic and work experience were found to be positively correlated with confidence; which means that less experienced younger students were less confident than older students. This can be related to older students having experienced more interaction with the outside world and might have faced more problems than young students. This finding was similar to studies conducted by Suliman (2006), Lederer (2007), Giancarlo and Facione (2001), and Colucciello (1997). However, this current study finding was incongruent with studies conducted by Zhang and Lambert (2008) and Ip et al. (2000). Zhang and Lambert (2008) found a negative correlation between self-confidence and the following demographic characteristics: age, academic experience, and nursing experience. Similarly, Ip et al. (2000) found older students to be less confident than younger students. In these two studies this finding was not expected since it is anticipated that, as the

individual gets older, he/she will become more mature, more educated, and more clinically experienced (Zhang & Lambert, 2008).

In the current study, age negatively correlated with truth-seeking. Truth-seeking abilities are linked with questioning, looking and searching for information and self work. Therefore, it is expected that those who are looking for information are more likely to be truth-seekers than those who are not, and that is supported by Facione and Facione's (2010) definition of truth-seeking in the CCTDI manual. It can be said that younger and less-experienced students lack information compared to older students who have experience. As a result, they will search more for information to meet their educational requirements, which might result in strengthening their truth-seeking abilities. The same reason is applied to the negative correlation between truth-seeking and previous work and nursing experience.

It is surprising that young students have higher maturity of judgement than older students. It was expected that age and experience would strongly influence this aspect. This finding was opposite to other studies' findings. Lederer (2007) found graduate students to have significantly higher maturity of judgement than undergraduate students. Moreover, Giancarlo and Facione (2001) showed that third-year and graduating students have a higher maturity of judgement than students in the first and second years. In this study, the intervention might have an effect on younger students' maturity of judgement scores. In addition, unequal distribution of older students among the groups might affect this study's finding, especially because the study has a small sample size. The majority of younger students were in the intervention group and most of the older students were in the control group. In the control group four students were aged between twenty-five and twenty-eight years old, and they formed 11.7% of the control group. However, in the intervention group only one student was

aged twenty-seven years old, and 96.6% of students were aged twenty-three years old or younger.

A study conducted by Suliman and Halabi (2007) showed no statistically significant differences between graduating students and beginners. Both groups' maturity of judgement scores were below 40, which indicated that both younger and older students had low maturity of judgement. This study was conducted in one of the universities in Saudi Arabia, which is same country as this study. Suliman and Halabi's finding suggests that older students' low maturity of judgement could be a consequence of culture. More reflection on cultural factors will be included later.

Younger students were found to be more open-minded than older students. Open-mindedness means 'tolerance towards the opinions of the others' (Facione & Facione, 2010, p.9). Students being open-minded can be related to their need to learn and to their lack of experience. However, older students' experiences might affect their open-mindedness. For example, Knowles (1980) explained how experience affects individuals' open-mindedness. He argued that 'adults acquired a larger number of fixed habits and patterns of thought, and therefore tend to be less open-minded' (p.50). This suggests that experience might result in individuals establishing their own way of thinking, and holding pre-conceived ideas about things. As a result, they will be very defensive and stick to the way they used to think and act.

It might be said that differences in some aspects of critical thinking dispositions between older and younger students, especially open-mindedness and truth-seeking, would affect their learning preferences. As a result, it might be best to apply different teaching styles which match different backgrounds and personal characteristics. The PBL elements might not be

favoured by older experienced students since this is different from the educational approach they had experienced. However, this might be favoured by younger students since they are likely to accept new approaches, as suggested by Kwan (2000). In addition, younger students would prefer to learn from other people to fulfil their learning needs. This is different from older experienced students whom Knowles et al. (2005) considered as relying more on their experience.

Students with the highest family income were more open-minded, truth-seekers, and mature. In addition, students whose mothers held a bachelor degree were more open-minded. It might be said that education and better income are related to each other. As mentioned earlier, education provides individuals with a better chance to find a job and thereby have a good income. The reason that family income and education had an effect on the above aspects of critical thinking disposition might be related to many other social factors. Education provides individuals with more 'insight, understanding, and openness' (Howard, 2002, p.70). According to Howard (2002), this will happen if the educational experience has first enhanced 'self-awareness'. Through education, parents might develop these characteristics and transfer them to their children. In Saudi Arabia, parents with higher incomes are usually better educated, with the majority of them having completed their education in Western countries, mainly the United States and the United Kingdom, where there is more consideration of individuality and autonomy. Therefore, it might be argued that, for those parents more open to the world, it had affected the way they raised their children. They might have adopted the Western style where there is independency of thought and more respect for individual opinions and decisions (Jenkins, 2011).

7.7. The relationship between students' critical thinking dispositions and their academic performance

This study found that there is a negative association between academic performance and critical thinking. Students who have high higher scores in the CCTDI showed lower performance. For the intervention group, the CCTDI results negatively correlated with students' GPAs, mid-term examinations, and final examinations. However, the control group's result showed a negative correlation between the CCTDI scores and GPA only. This means that more negative correlation was found between the intervention group's critical thinking dispositions and performance compared to the control group.

Negative correlation between the CCTDI and performance could be as a result of the examination questions favouring students' abilities to memorise what had been taught through the semester. This was acknowledged by this study's participants, who said that their teachers want them to copy the answers from books and write them in the examination papers instead of using their thinking. For the intervention group, their higher negative correlation might be related to the reason that the intervention group participants learned to use their thinking. They might have used this skill to answer in a manner which does not match the traditional way of answering the examination papers, which are mainly in the form of multiple choice questions. Consequently, this might have resulted in students losing marks. Lohse et al. (2003) found their PBL group to be less reliant on memorisation compared to the lecturing group. In addition, Jones (2008) found that PBL students prefer to learn from real situations rather than text books. This could be the same situation in this study.

Therefore, it might be said that PBL programmes require different evaluation methods; the traditional evaluation methods may not be applicable for students taught by PBL or not

(Wood, 2004). According to Wood (1994), the main aim of PBL is developing students' problem-solving skills; therefore, with PBL, it is necessary to have evaluation methods that assess students' abilities to think and doing rather than memorising. He suggested using essay questions in the form of a question like 'what you will do next?'. Scouller (1998) argued that writing an essay requires thinking and analysing; this may develop 'deep' learning, although some students might adapt a 'surface' learning style while writing.

Scouller (1998) reported a study conducted among University students who were studying an education programme. The study aimed to examine students' approaches to preparation for two different evaluation methods: multiple choice assessment methods, and essays. She found students were adopting a different style of learning for each type of assessment. They used surface learning for the multiple choice method and deep learning for essay assessment. In addition, she found that students perceived essays to be developing them intellectually more than the multiple choice assessment.

7.8. Cultural effect on students' critical thinking disposition

In this study not one of the groups reached the score of 300. The maximum score achieved was 287.93, by the intervention group. A score of 300 is considered as the starting point of higher dispositions (Ozturk et al., 2008). This finding was similar to many other studies' findings (Ozturk et al., 2008; Suliman & Halabi, 2007; Shin et al., 2006a; Tiwari et al., 2006a; Ip et al., 2000). It was noted that these studies were all conducted within non-Western countries including Asia, Saudi Arabia and Turkey. Other studies showing higher critical disposition were conducted in Western countries, Canada and the United States (Lederer, 2007; Profetto-McGrath, 2003; Day & Williams, 2000; McCarthy et al., 1999). In Day and Williams's (2000) study, students showed positive critical thinking disposition even before

being subjected to the PBL programme. Moreover, the same result was experienced by Lederer (2007). In this study, first-year students had high critical thinking disposition, and it increased with each academic year.

This study finding might reflect the effect of education at primary and secondary school in Saudi Arabia. It might be speculated that Saudi students are habituated to a rote learning style and by the time they reach university it is too late for them to change their style. Moreover, this suggests that, not only does the educational system affect students' critical thinking disposition, but also students' cultural background. Low critical thinking abilities might be related to the cultural environment of this study. The literature suggests that Westerners and non-Westerners are varied in their views, thoughts and ways of learning (Jenkins, 2011; Ryan & Louie, 2007). In a Western society, individuality and personal freedom are crucial; whilst non-Western societies are based on families or groups rather than individuals (Jenkins, 2011). Jenkins (2011) argued that in Asian societies individuals are a part of their families and they do not see themselves as separate elements. Decisions in non-Western societies are usually made by the whole family, not independently. Independent decisions are considered as disrespectful and selfish. This is different from Western societies, where taking independent actions and decisions are both appreciated. Another important aspect which should be highlighted is that in non-Western societies people who are in authority are treated differently and with more respect, whilst in Western societies such people are dealt with less deferentially. Differences in the way that individuals are raised have a strong effect on critical thinking abilities. Western individuals can be seen as 'assertive, independent, with critical thinking abilities.' However, non-Western individuals tend to be 'passive, dependant and with lower critical thinking abilities (Ryan & Louie, 2007).

For students used to being dependent on their family and not taking the initiative to make independent decisions, this might affect the development of their thinking abilities. They might not be able to think and act because they are used to relying on others to make decisions for them. This might also be related to other factors such as fear of the unknown or the circumstances of decisions.

Hofstede and Hofstede (2005) categorised Saudi Arabia as a country where there is high power distance, high uncertainty avoidance, collectivism, and feminism. According to them, in societies with high power distance, there is inequality in the relationship between teachers and students. Moreover, power distance is associated with social distance between superiors and subordinates (Bjerke & Al-Meer, 1993). According to Hofstede and Hofstede (2005), the aim of education in a collectivist country varies from that in an individualist country; in the latter, education aims to prepare students to undertake a role in their society. This will be facilitated through helping students 'to know how to do' and 'to know how to learn' (p.98). Students are prepared to deal with new and unexpected circumstances. This is different from a collectivist education where students' learning is a consequence of their traditions, and learning is not seen as a continuous process, but as something that happens only when individuals are young. Individuals learn only 'how to do', just to engage in their societies. In addition, in this kind of culture students bond to groups; they will not speak unless they are encouraged by the others. Students are not expected to initiate a conversation. They do not speak even when there are questions asked by the teacher, unless s/he selects a specific student to answer. Moreover, in a collectivist culture, students will not speak in front of a large number of people, unless they are encouraged and supported by their teacher. On the other hand, in a feminine culture, assertive behaviours are not appreciated and considered as ridicule.

The above factors might answer the question of why this study and other non-Western study participants demonstrated lower critical thinking dispositions, compared to studies conducted in Western countries. It might be argued that the characteristics of this study's culture had an influence on students' critical thinking. The education might not encourage students to develop the abilities of dealing with unknown situations. This will hinder students from developing their critical thinking abilities. In addition, the educational environment itself limits student abilities to develop the questioning habit, since students are not encouraged to speak or even answer questions. Bjerke and Al-Meer (1993) argued that the Saudi culture allows its individuals to be more in the 'feminine' aspect of Hofstede's cultural dimensions. This dimension reflects cultivating and establishing a friendly relationship with others. In the current study, this might affect students' questioning abilities in terms of developing the ability to ask challenging questions. Students might prefer to be friendly and keep good relationships with their teachers to avoid causing any embarrassment. Furthermore, considering assertive behaviours as unacceptable might have an effect. These cultural factors could hinder students' abilities to develop what can be referred to as a questioning mind; consequently, students' critical thinking abilities will not develop. Another factor might be that a strong bonding to a group might affect students' self-confidence, since members are relying on the others to encourage them to speak or ask, rather than initiating that by themselves.

7.9. Students' perceptions of the traditional teaching approach

Students mentioned that their academic experience had affected their personal life and emotional status negatively. They were unhappy, depressed, frustrated and unsatisfied with their academic achievements. They related these negative perceptions to the school's lack of support and physical and mental pressure applied by their education. Howard et al. (2006)

considered environmental factors to be affecting individuals' performances and referred to that as 'perceived barriers or enablers'. In their view, perceived barriers are different from 'objective performance constraints'. The first one means that individuals are acting according to their perceptions, which could be based on real factors or non-existing factors. However, objective performance constraints referred to existing constraints such as time limitation and lack of resources. Perceived barriers affect individuals' motivation to learn indirectly, whilst objective performance constraints result in a direct effect on individuals' performance. It might be argued that factors students mentioned in this study, such as lack of support and academic pressure, are reflecting the two kinds of constraints. Lack of support by the school might be seen as a perceived barrier. However, objective constraints could be academic pressure such as educational materials, assignments, and spending long hours in school and hospital.

Sanders and Lushington (2002) found stress negatively affecting students' academic performance. Moreover, stress experienced by student nurses and nurses working in hospitals was found to be a reason for staff nurse shortage around the world (Galbraith & Brown, 2011). Jones and Johnston (2000) considered using stress management techniques and developing skills such as problem solving and interpersonal skills to reduce the level of stress. This finding suggests that student nurses require a great degree of attention by the school management. Schools should address students' needs; it might be necessary to interview students regularly and collect their perceptions about their education. Students' views of their educational experiences are important; they will help in ascertaining the quality of learning that students are receiving and to what extent learning is being facilitated (Clarke et al., 1984). Moreover, facilitating social activities in addition to education would be helpful, and more flexible roles might be required. The organisation should encourage students' to

contribute to the school's cultural and political decisions. For example, students might nominate a representative who will represent them in the school's meetings when discussing issues regarding their education. This will enhance students' satisfaction and will contribute to their personal growth. Furthermore, their relationship with the organisation might be much better. Students should be treated as mature individuals who are responsible for their behaviours. They have the right to decide on how to spend their free time. The organisation should encourage students to attend activities outside college instead of preventing them.

According to Sanders and Lushington (2002) changing from 'didactic' traditional teaching techniques to PBL might reduce stress and its negative influence on students' academic performance. This was supported by Jones and Johnston (2006); they found PBL improved students' general wellbeing. It increased their abilities to cope and adapt to personal problems. In addition, it reduced their distress and worries compared to a traditional teaching group. This finding provides more support for the usefulness of PBL.

Student reflections found that they perceived inconsistencies between their teachers' information and that of their clinical instructors'. This has resulted in students not trusting their teachers' knowledge. It might be argued that all teaching materials are prepared from books used by the school organisation. However, students' perceptions of their teachers' knowledge are influenced by their perceived theory-practice gap. Students' questions to the clinical instructors are usually about practical issues. They might find the nursing tasks done in the hospital are different from how they were taught by their teachers. What is taught in text books might be difficult to apply to the practice environment. Corlett (2000) argued that nurses' concerns are about completing the job without paying attention to the details of how it is done. In contrast, teachers are more concerned with teaching students the ideal way of

doing things. The theory-practice gap and conflicts between nurses' and teachers' knowledge might result in students considering teachers' information to be not 'up-to-date' and they might then question their 'credibility' (Corlett, 2000). This is what happened in this study, where students considered their teachers' information not to be updated. This finding could result in students being confused and even anxious and worried. Dale (1994) argued that the 'theory-practice' gap could be referred to as the 'theory-theory' gap. She argued that this occurs when nurses and teachers teach theory in different ways and she related that to limited experiences. The outcome of this problem might be adverse and might go beyond the college years. This could result in students lacking confidence and they may experience reality shock, because what they study is different from the real practice. Therefore, collaboration between hospital nurses and teachers is required.

Dale (1994) suggested reducing this gap through improving teachers' practical skills. Teachers need to arrange regular visits to the hospital to become updated on current nursing practice. In addition, they might take this as a chance to identify any problems concerned with students' knowledge and practical skills (Corlett, 2000). Moreover, there should be a prior agreement between teachers and nurses about the way students will be taught either in hospital or school. Corlett (2000) suggested inviting hospital staff to school to participate in teaching courses related to their area of speciality. Specialised hospital staff might demonstrate more effective teaching (Corlett et al., 2003). Corlett et al. (2003) referred to nurse teachers as 'generic teachers', who have to teach different subjects in different specialities. According to them, organisations with a traditional style of education tend to follow this way of teaching instead of recruiting teachers who are skilled in specific areas.

Students were not happy with the assessment methods used in the school. They said that the examination papers assess their memorisation instead of their understanding. Furthermore, they considered this as an unfair way of assessment because students who answer from their understanding end up receiving less marks than those who use their memorisation. Assessment methods are essential; they form students' ways of learning (Scouller, 1998). Duff et al. (2004) considered assessment methods that assess students' memorisation or 'rote-learning' as 'surface approach' evaluation methods, whilst other methods which assess students' abilities of analysing, synthesising, and thinking critically were considered as 'deep approach' assessment methods. Therefore, students' reflections on the assessment methods speculated that their examinations encourage them to develop surface learning. Moreover, it might be suggested that the teacher's way of assessment might shape students' depth of learning and affect the development of analytic and thinking skills. This finding also justifies students' low scores in the CCTDI. Today's complicated health problems require nurse education programmes to redesign curriculums to help nursing students develop lifelong learning (Ip et al., 2000). This will not be facilitated through surface learning.

Previously, it has been suggested that students' ways of learning are affected by their educational context (Duff et al., 2004). This might allow us to take another view of students' reflections. Students' experience of the PBL elements might have allowed them to change their perceptions of the assessment methods. Their experience of thinking, analysing, and problem solving might have changed their habit of relying on memory while answering, which has indirectly affected their perceptions. They now prefer to answer from their thinking rather than using their memory.

7.10. Students' perceptions of the intervention

The study results indicated satisfaction with implementing the PBL elements to their course. That was concluded from students' perceptions. They perceived the sessions of the PBL elements as allowing them to develop the following skills: critical thinking, communication skills, listening, open-mindedness, team working, encouragement and motivation, self-confidence, high self-esteem, being more organised, better performance and knowledge retention, linking theory to practice, self-directed learning and participation in the learning process, and independence. Findings are consistent with those found in previous studies (Hussain et al., 2007; Saalu et al., 2010; Jones, 2008; Haghparast et al., 2007; Cooke & Moyle, 2002; Connolly & Donovan, 2002; Morales-Mann & Kaitell, 2001; White et al., 1999; Stern, 1997). In a previous study conducted by Chaves et al. (2006), students were asked to evaluate PBL; the results showed that respect and being responsible had received the highest rating by students compared to communication skills, self-awareness, and gaining knowledge. This suggests that students' general satisfaction with PBL can be related to their feelings of value and respect (Connolly & Donovan, 2002). In addition, these feelings might have resulted from involvement and participation in the learning process and discussion. In this study, students argued that they felt they are individuals who have knowledge and can think. This might reflect their feelings of value and respect. Moreover, students' positive attitudes towards the intervention might be related to this strategy to provide students with the chance to experience patients' problems and clinical setting before being exposed to actual clinical practice (Haghparast et al., 2007). Another reason for the satisfaction might be that this is a novel experience: students perceived the intervention as 'interesting and a great idea'. This might result from the intervention simply being a new approach which is totally different from routine lectures. In their study, Cooke and Moyle (2002) considered PBL being a 'novelty' to be a reason for students' satisfaction. Moreover, the majority of students

being young might be another reason. According to Kwan (2000), younger students might be more flexible and can easily adapt to new learning approaches.

Students perceived the work associated with the intervention to be time-consuming and applying pressure on them. The intervention of the PBL elements was another extra job to do and, trying to balance between this and other lecture work, plus the clinical training reports, increased their overall workload. The issue of workload has been addressed in previous studies (Yuan et al., 2009; Lee et al., 2004; Connolly & Donovan, 2002). Smith and Coleman (2008) suggested implementing a more flexible programme to reduce students' pressure, achieve their requirements, and help them to benefit from the programme's positive outcomes. It might be necessary to reduce the number of lectures given and give students the responsibility to cover what was not taught by the teacher. However, this might lead to another problem, students might be less satisfied about the quality of their knowledge since they will be receiving fewer lectures. In addition, they might experience more stress, anxiety and another workload. Yuan et al. (2009) found students struggling with finding information on their own without it being provided for them, which led to more work overload.

Lack of time was an issue addressed by students. This issue provides the suggestion that the sessions where the intervention is implemented should be given enough time to allow students to work on scenarios very carefully without being distracted by lack of time. Time constraint may reduce the efficiency of sessions and affect the quality of learning that students receive. Hussain et al. (2007) had highlighted the issue of time constraints in their study.

7.11. Reflection on the effectiveness of the adult learning theory as a theoretical model for this study: how the PBL elements and Malcolm Knowles's adult learning theory are related to each other

The findings of this study suggest that the implementation of the PBL elements is facilitating what has been proposed by Malcolm Knowles in his adult learning theory. In this study, through the PBL element sessions, students were self-directed and they were able to decide on what they 'need to learn' and 'how they learn it'. Self-directed learning through deciding on what and how to learn will facilitate 'lifelong learning' (Moore, 2007). Using real life problems and encouraging students to discuss them and reflect on them will enable students to recall previous knowledge and experience. This will help students to achieve what Knowles referred to as learning from experience (Knowles et al., 2005). Recalled knowledge and experience in addition to using what has been learned recently from lectures will help students to analyse and solve problems. This will improve students' critical thinking skills and allow for knowledge retention.

In his theory, Knowles suggested that individuals' experiences might negatively affect their flexibility to accept new things and others' opinions (Knowles et al., 2005). This quantitative study's finding further supported that. Older students scored low in open-mindedness and that was related to the effect of their experience.

Knowles speculated that adults' readiness to learn will be enhanced when, with the learning process, there is established tasks to encourage students to develop from one level to another. In addition, students' eagerness to learn will increase if they were allowed to deal with real life problems (Knowles et al., 2005). It might be suggested that all these factors are available with the strategy of the PBL elements, in which scenarios encourage students to learn from

real patients' problems that develop from level to level. This will increase students' interest to learn and might positively affect their knowledge retention as has been claimed by this study's participants.

Designing the case scenarios in a way that are very near to reality will facilitate what is referred to as being 'life centred' while learning. Realistic cases will allow students to experience real clinical situations before seeing them in the hospital. This will reduce the theory-practice gap. Consequently, students will easily transfer from the class-based setting to the clinical-based setting. They will be able to transfer their confidence and autonomy to their practice. As a result, they will easily cope with the clinical setting and its unexpected and complicated situations. This is necessary for proficient nursing practice and patients' safety.

A very important element of Knowles' theory is examining one's own habits and accepting knew things. This will be facilitated through discussion and interaction between group members where students listen to other members' arguments. This will contribute to students being more open-minded and accepting of others' views and opinions.

Knowles discussed the role of motivation in the adults' learning process. He argued that external and internal factors influence adults' interest to learn. This study finding supported that; there were differences between students' academic performances according to their academic experiences and family background (educational and financial). This was related to the presence of external factors such as seeking a better salary or a higher position; or internal factors, such as looking for a better quality of life or a better social position.

Finally, it might be argued that, in this study, the key elements of the intervention are the case scenarios and students' discussion and interaction. They seem to translate Knowles's concepts into observed positive outcomes.

7.12. Conclusion

Saudi Arabia is a young country. It was developed in 1932 and considered as the largest country within the Arabian Peninsula. The development of the oil industry in this country has affected many aspects; great economical and technological developments have been experienced. The country is experiencing a rapid change in terms of the number in the population and the presence of complex expensive diseases. This has contributed to a great demand on the health care system. The country is experiencing a nursing shortage as are other countries. Moreover, the health care setting requires highly proficient nurses, who are able to make the best clinical judgement and able to practice with high confidence.

This study makes a unique contribution to Saudi nursing education. It evaluates the effect of introducing an active teaching method, particularly PBL elements, to a traditional teaching course, by contrasting the effects with those of the traditional approach alone. Moreover, it helps to explore the effect of these methods on nursing students' learning outcome and personal development.

The study findings suggested that incorporating PBL elements within traditional teaching courses positively affects students' critical thinking dispositions, rather than adhering only to a traditional teaching approach, which led students to be passive learners instead of participating in their learning. The study findings were similar to previously conducted studies aiming to compare between PBL and traditional teaching methods.

In this study the post-test CCDTI scores indicated that the intervention group had higher critical thinking dispositions than those of the control group. The literature suggested many factors present within the PBL elements led to the intervention group enhancing their critical thinking dispositions, such as discussion, group work, and students' active participation.

It was found that in this study the intervention group had improved in certain subscales, namely truth-seeking, systematicity, and confidence. In addition, they had higher subscale scores than the control group in analyticity, inquisitiveness, and maturity. These improvements were considered to be related to many factors such as the intervention group searching for information independently, taking control over the learning process, group work, and the students being organised while approaching problems as a result of using a trigger guide; in addition to other factors such as developing interpersonal skills through communication and group work.

Differences in academic performance between the intervention and control groups and between younger and older students were a significant issue in this study, which are worth highlighting. These factors were discussed in the light of previous studies on PBL and other learning and teaching approaches, and how they affect students' learning outcome. The intervention group maintained their grades because of the positive effect of introducing the PBL element, as discussing the problems in case scenarios allowed for the retrieval of previous knowledge, and increased knowledge retention. In addition, students' motivation to learn, the learning process being easier, and group work might enhance students' learning and memorisation.

Regarding the difference in academic performance between older and younger students, rather than age, experience, and maturity, there might be other factors such as students' perceptions of the learning environment. This was discussed in many studies where students' perceptions of the learning environment were found to be influencing their learning outcome and learning approach. A negative perception was related to a surface learning approach and a positive perception was linked to a deep learning approach. This finding led to the proposition that low academic performance for younger students might be a consequence of them developing a surface learning approach as a result of negative perceptions of their academic experience, where a heavy workload load and unsatisfactory assessment methods were perceived.

The study findings also suggested that students' demographic characteristics would affect their critical thinking dispositions. Namely, age and academic and work experiences were found to have an effect on certain subscales such as confidence, open-mindedness, and truth seeking. Younger students had lower scores in the confidence subscale than older experienced students. In addition, more younger students were truth seekers and they were more open-minded than older students. Older students' higher scores in confidence were related to their experiences. In addition, younger students' higher truth seeking and open-mindedness scores were related to them feeling in need of learning and having less prior experience. However, older students might be biased by their prior experiences. In addition, younger students are more likely to accept new things, including accepting learning cues from their peers to help fulfil their learning requirements.

In this study an interesting and important finding was discussed, which is the negative correlation between the intervention group's academic performance and the CCTDI. That

shed light on the design of the assessment methods. It was speculated that the examination questions are assessing only students' abilities of memorisation, rather than their thinking. Findings were supported by this study's intervention group's reflections and previous literature. Based on that, it was suggested that different assessment methods assessing students' thinking might be required for courses implementing PBL.

Another issue highlighted in this study was that the CCTDI scores of these study participants, and other studies conducted in Saudi Arabia and other non-Western countries, were lower than those of Western countries. This finding was related to the effect of cultural context on the development of critical thinking disposition.

The qualitative data in this study showed that student demonstrated dissatisfactions with their experience of the traditional teaching approach. They are overwhelmed, frustrated, and not happy. They perceive a lack of support, are not confident about their clinical skills, and not happy with the learning they experience. Those factors might affect their interest in studying and indirectly affect their academic achievements. Students require a supportive atmosphere that enhances their learning. On the other hand, students were happy with their experience of incorporating the PBL elements to their course. This approach positively affected students personally and academically.

This study results suggest that the nursing curriculum within Saudi colleges and universities should be redesigned in a way that develops critical thinking. The current curriculum has many problems; it relies on rote learning, there is a lack of critical thinking development and self-directed learning, subjects are crowded, there is a theory-practice gap, and numerous exams and lectures. In their reflection on Saudi medical education, Al-Gindan et al. (2000)

argued that curriculum reforms should reflect existing problems and future demands. In addition, the new curriculum should be built on the current curriculum. Their view is applicable to the Saudi nursing education. Changes are required to teaching strategies, materials, and evaluation methods. It may be best for nursing colleges to redesign their curriculum in a way that facilitates life-long learning. This can be achieved through changing the way of teaching from a content-based method into a more clinical-based method where problem-solving and self-directed learning is central. Great attention must be given to the student-teacher relationship to change that into a student-facilitator relationship to promote critical thinking (Al-Gindan et al., 2000). Students should take part in their learning process: active participation is required to enhance learning and ensure personal growth. The study findings call for collaboration between the hospital and the university to ensure that students are receiving the best education. In addition it is recommended that university teachers update their clinical skills to inform students of appropriate contemporary clinical practice.

Finally, the study finding supports what has been argued in the literature about the positive PBL outcomes. Factors available within the PBL process, such as active participation, thinking and analysing, contribute to developing nursing students' critical thinking and other abilities, such as communication skills and other positive learning outcomes. However, this strategy might not be useful alone; it might be combined with lecturing, in which students will have the strong knowledge base and then increase their knowledge and enhance learning through PBL.

I believe this study has achieved its aim by clearly describing and reflecting on the Saudi nursing education system. Its findings will aid the nursing faculty to re-examine their education system and develop it in a way that matches the demands of today's changing

clinical environment and help in producing highly proficient nurses, with the skill sets required to cope with an increasingly complex clinical environment.

7.13. Recommendations

1. Nursing curricula require reviewing and redesigning. Incorporation of methods that facilitate self-directed learning and critical thinking is highly recommended.

2. Overcrowded taught materials and the number of lectures require reduction to reduce pressure applied on students. This can be facilitated through allowing students to take part in their learning.

3. Standardising curricula is necessary. Saudi universities and colleagues in private and governmental educational institutes should teach the same materials. This will contribute to graduating nurses with specific standards with disregard from where they had graduated and what level of certificate they had.

4. It might be required that the Ministry of Higher Education establish a committee concerned with evaluating education in nursing colleges and universities within the country. This might be facilitated through periodical visits to review and evaluate educational materials and methods used.

5. Great attention should be given to students' clinical skills. Education must rely more on context-based learning to enhance students' practical skills and familiarise them with the clinical environment.

6. School teachers need to collaborate with hospital nurses to allow for facilitating the best theoretical and clinical education.

7. School teachers should be required to update their nursing practices.

8. Conducting longitudinal studies that evaluate nursing students' critical thinking and academic performance is required in order to examine the effectiveness of old and new teaching methods and curricula.

9. It is necessary to collect students' opinions about their learning experiences and administrative issues within the college. Students must be asked to provide suggestions about what they consider useful for them.

10. During preparing assessment methods and examinations it is necessary to take into consideration students' differences; not all students have the skill of memorising. In addition, the priority of assessment methods should be to assess and develop students' thinking; not to assess how much information they can remember.

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Appendix I

Ethical permission

King Abdul Aziz University

Ref. FM /   / 8

Date : 4 / 01 / 2009

ETHICS AND RESEARCH
COMMITTEE

الرقم ....
التاريخ :   /   /   ١٤ هـ
المرفقات ....

To :   Wafa Al Johani, PhD candidate
From: Dr. Essam H. Jiffri, Chairman, Ethics and research Committee
Date: Sunday, 4 January 2009
Re :   Research proposal (the effects of teaching strategies on nursing students'
       critical thinking abilities and performances: problem based teaching
       VS traditional teaching)

Dear Mrs. Wafa Al Johani,

The above titled project, in fulfillment of your PhD degree in the University of Sheffield,
school of nursing and midwifery, United Kingdom has been discussed in the ethical
committee meeting held on, 4 January 2009

The ethics and research committee has reviewed your research proposal which will involve a
randomized controlled trial (RCT), mixed methods between qualitative and quantitative
designs, which will be carried out in the Medical surgical course given to third year students
in the nursing department at King Abdul Aziz University during the academic year 2009-
2010. The following sections of your research proposal were reviewed in relation to ethical
aspects:
1- Research objectives.
2- Methodology: including study design and data collection methods (Critical   thinking
Disposition Inventory self reporting questionnaire, and reflected journals.
3- study components and outcomes variables : Critical thinking abilities of third year nurses
after introducing problem based learning teaching methodology to the experimental group,
and comparing it with the control group
4- information letter and consent forms to be provided to recruited students.

 I am pleased to say that the committee was satisfied in relation to its ethical aspects.

We wish you all the best in your project.

Yours Sincerely

Dr. Essam H. Jiffri
Chairman, Ethics and Research Committee.

Appendix II

Ethical permission

University of Sheffield

The School Of
Nursing
And
Midwifery.

Wafaa Al-Johani

Flat 303, Metis
1 Scotland Street
SHEFFIELD
S3 7AQ
United Kingdom

08 September 2008

Dean
Anne M Peat

Samuel Fox House
Northern General Hospital
Herries Road
Sheffield S5 7AU
United Kingdom
Telephone: +44 (0) 114 2269849
Fax: +44 (0) 114 2269790
Email: l.tecsi@sheffield.ac.uk

Dear Wafaa

The effect of teaching strategies on nursing students' learning and performances: critical thinking versus traditional teaching - URMS-123417 ERP-091

I am pleased to inform you that on **07 October 2008** the School's Ethics Reviewers **approved** the above-named project on ethics grounds, on the basis that you will adhere to, and use the following documents that you submitted for ethics review:

• Research ethics application form
• Participant information sheet
• Participant consent form

If during the course of the project you need to deviate from the above-approved documents, please inform me. The written approval of the School's Ethics Review Panel will be required for significant deviations from or significant changes to the above-approved documents. If you decide to terminate the project prematurely, please inform me. Should you have any queries, please do not hesitate to contact me, either by email *l.tecsi@sheffield.ac.uk* or by phone *0114 2269815*.

Yours sincerely

Laszlo Tecsi
Research Administrator

cc:
Professor Roger Watson - Chair of Ethics Review Panel
Dr Tony Blackett – Supervisor of Student

THE QUEEN'S
ANNIVERSARY PRIZES
2007

Appendix III

CCTDI

CCTDI

A Disposition Inventory

Dr. Peter A. Facione
Dr. Noreen C. Facione

Please wait for the instruction to begin.

INSIGHT
ASSESSMENT

For information about the CCTDI contact Insight Assessment
www.insightassessment.com

The CCTDI is a survey of your beliefs and opinions.

Respond to each statement in terms of how much you personally agree or disagree.

\

CCTDI

DIRECTIONS:

Use a No. 2 soft lead pencil only. Do not use a pen or marker.

Write your name on your CCTDI CapScore™ answer sheet.

Bubble in and write in your identification number.

Indicate how strongly agree or disagree with each of the 75 numbered statements by filling in the appropriate place on the CCTDI CapScore™ answer sheet.

Here are two examples.

Example A: **The best things in life are free.**

E.g. A   O O O O O ●
Agree Strongly . . . . Disagree Strongly

Example B: **I'm always doing more than my share of the work.**   **E.g. B**   O ● O O O O

The location of the ● response to **E.g. A** shows someone in very strong disagreement with Example A. The location of the ● response to **E.g. B** shows moderate agreement with that statement.

If you erase a response, be sure the erasure is clean.

---

1. Considering all the alternatives is a luxury I can't afford.

2. Studying new things all my life would be wonderful.

3. The best argument for an idea is how you feel about it at the moment.

4. My trouble is that I'm easily distracted.

5. It is never easy to decide between competing points of view.

6. It bothers me when people rely on weak arguments to defend good ideas.

7. The truth always depends on your point of view.

8. It concerns me that I might have biases of which I'm not aware.

9. I always focus the question before I attempt to answer it.

10. I'm proud that I can think with great precision.

11. We can never really learn the truth about most things.

12. If there are four reasons in favor and one against, I'd go with the four.

13. Men and women are equally logical.

14. Advice is worth exactly what you pay for it.

15. Most college courses are uninteresting and not worth taking.

16. Tests that require thinking, not just memorization, are better for me.

17. I can talk about my problems for hours and hours without solving anything.

18. Others admire my intellectual curiosity and inquisitiveness.

19. Even if the evidence is against me, I'll hold firm to my beliefs.

20. You are not entitled to your opinion if you are obviously mistaken.

21. I pretend to be logical, but I'm not.

22. It is easy for me to organize my thoughts.

23. Everyone always argues from their own self interest, including me.

24. Open-mindedness has limits when it comes to right and wrong.

25. It is important to me to keep careful records of my personal finances.

26. When faced with a big decision, I first seek all the information I can.

27. My peers call on me to make judgments because I decide things fairly.

28. Being open-minded means you don't know what's true and what's not.

29. Banks should make checking accounts a lot easier to understand.

30. It is important to me to understand what other people think about things.

31. I must have grounds for all my beliefs.

32. Reading is something I avoid, if possible.

33. People say I rush into decisions too quickly.

34. Required subjects in college waste time.

35. When I have to deal with something really complex, it's panic time.

36. Foreigners should study our culture instead of us always trying to understand theirs.

37. People think I procrastinate about making decisions.

38. People need reasons if they are going to disagree with another's opinion.

39. Being impartial is impossible when I'm discussing my own opinions.

40. I pride myself on coming up with creative alternatives.

41. Frankly, I am trying to be less judgmental.

42. Frequently I find myself evaluating other people's arguments.

43. I believe what I want to believe.

44. It is just not that important to keep trying to solve difficult problems.

45. I shouldn't be forced to defend my own opinions.

46. Others look to me to establish reasonable standards to apply to decisions.

47. I look forward to learning challenging things.

48. It makes a lot of sense to study what foreigners think.

49. Being inquisitive is one of my strong points.

50. I look for facts that support my views, not facts that disagree.

51. Complex problems are fun to try to figure out.

52. I take pride in my ability to understand the opinions of others.

53.   Analogies are about as useful as a sailboat on a freeway.

54.   You could describe me as logical.

55.   I really enjoy trying to figure out how things work.

56.   Others look to me to keep working on a problem when the going gets tough.

57.   Getting a clear idea about the problem at hand is the first priority.

58.   My opinion about controversial topics depends a lot on who I talk to last.

59.   No matter what the topic, I am eager to know more about it.

60.   There is no way to know whether one solution is better than another.

61.   The best way to solve problems is to ask someone else for the answers.

62.   Many questions are just too frightening to ask.

63.   I am known for approaching complex problems in an orderly way.

64.   Being open-minded about different world views is less important than people think.

65.   Learn everything you can, you never know when it could come in handy.

66.   Life has taught me not to be too logical.

67.   Things are as they appear to be.

68.   If I have to work on a problem, I can put other things out of my mind.

69.   Others look to me to decide when the problem is solved.

70.   I know what I think, so why should I pretend to ponder my choices.

71.   Powerful people determine the right answer.

72.   It is impossible to know what standards to apply to most questions.

73.   Others are entitled to their opinions, but I don't need to hear them.

74.   I am good at developing orderly plans to address complex problems.

75.   To get people to agree with me I would give any reason that worked.

Appendix IV

Demographic data form

Demographic data

1. Age

....

2. GPA

....

3. Academic experience

Bachelor of Science   □

Nursing Diploma   □

4. Working experience

Yes   □

No   □

If yes, please explain the nature of work and for how long.

....

....

3. Do you have any previous nursing experience?

Yes   □

No   □

If yes, for how long? ....

4. Have experienced active learning before?

Yes   □

No   □

Appendix V

Information sheet and consent form

Information sheet

Research project title: The effects of teaching strategies on nursing students' learning and performances: critical thinking versus traditional teaching.

Information about the research process

Dear students,

This research is aiming to examine the effectiveness of a new teaching strategy named Problem-Based Learning (INTERVENTION). To meet the aim of the research your participation is sought. If you agree to participate in the research, you will be randomly separated into two groups and will be taught in two different ways. One group will be taught as standard and will be called the lecturing group, whilst the second group will be taught by a INTERVENTION strategy, and called the INTERVENTION group. The allocation of students to both groups will be done blindly; each student has the possibility to be in either the INTERVENTION group or lecturing group.

Before starting the program you will be asked to complete a test named the California Critical Thinking Disposition Inventory (CCTDI). This test aims to investigate your opinions regarding certain statements. The test includes 75 questions which have no wrong or right answers; they are only evaluating your beliefs and opinions. All that you are required to do is to choose from the options which range from agree strongly to disagree strongly. The outcome of this test has no bearing on your evaluation through the semester.

At the end of the semester, the CCTDI is going to be administered again in order to compare the two groups. Furthermore, your examination records will be compared in order to find if there are any differences. In addition to that, the INTERVENTION group will be asked to write a detailed reflective journal about the personal experience with INTERVENTION

For confidentiality, you will be asked not to write your names on the CCTDI papers or on the examination papers. All you need is to give your university identification number. Please read the CCTDI questions very carefully and take your time to answer them. Furthermore, reflective journals will be completely anonymous and will afford the opportunity to write your views freely.

The research is part of a doctoral degree. Findings will be summarized and provided to the head of the nursing program at the University of King Abdul Aziz and to each participant. Moreover, findings will be discussed with the dean of the nursing school as well as the head of the nursing program to consider implementing the findings. Furthermore, the research findings will be presented in conferences and may be published. This study could form the base of a new educational system within nursing colleges in Saudi Arabia.

The INTERVENTION is not expected to cause any negative effect on your performance. Your collaboration on this research will be highly appreciated. If you need any further clarifications, please do not hesitate to ask.

Consent form

Research project title: The effects of teaching strategies on nursing students' learning and performances: critical thinking versus traditional teaching.

I agree to participate in this research project. The research has been explained to me, I have read the information sheet, been given the opportunity to ask questions and had them answered to my satisfaction. I have been assured that my participation is voluntarily and I can withdraw from the study at any time and join the lecturing group. In this case, my data will not be included in the research.

My agreement to participate in this project indicates that I agree to:
- Complete the California Critical Thinking Disposition Inventory Test (CCTDI).
- Be either in the INTERVENTION group or lecturing group and join the lecturing group if I decide to withdraw from the research.
- Adhere to the regulations of INTERVENTION **(for INTERVENTION group only)**.
- Allow the researcher to see my examination and academic records.
- Provide my opinion about INTERVENTION in writing **(for INTERVENTION group only)**.

I have been assured that all information given will be confidential, and data gathered will not be associated with identity. In addition, I understand that data collected will only be used for the purposes of the research.

Note:
All records and data which are either hard copies or electronic copies will be held securely in a locked office, or password protected, respectively.

Student Name: ----------------------------

Signature: -------------------------------

Date: -------------------------------------

Witness Name: ---------------------------

Signature: -------------------------------

Date: -------------------------------------

Appendix VI

Teaching plan and course topics

King Abdul-Aziz University
Faculty of Applied Medical Sciences
Academic Nursing Department

Details Teaching Plan of Medical- Surgical Nursing II
Critical Care Nursing
1429-1430\2008-2009

Weeek NO.	Day	Time	Topics	Faculty member
1	Monday 2/3/09	3-4	Introduction to critical care nursing	Dr Nemaa
	Tuesday 3/3/09	8-12	-Nursing in emergency conditions and the nursing process in emergency department. - Gerontological consideration - infection control - Discharge planning - principle of emergency management - Emergency resuscitation measures - Emergency management of airway obstruction - Control of hemorrhage - Assessment of abdominal injuries - Crush injuries	Dr Nemaa
		1-3	Lab Mechanical ventilation (GA) Lab ABG(GB)	Miss/fatmah Miss / Afnan
	Wednesday 4/3/09	8-12	-fracture - Heat stroke - Cold injuries -Accidental hypothermia - Anaphylactic reaction - poisoning -Drug abuse ,alcohol -Psychiatric emergency - Sexual assault	Dr Nemaa
		1-3	Lab Mechanical ventilation (GB) Lab ABG(GA)	Miss/fatmah Miss / Afnan
2	Monday 9/3/09	3-4	1-Shock: - Definition , significance, classification.	Dr Wafaa
	Tuesday 10/3/09	2-4	1-Shock: - pathophysiology of shock . - stages of shock . 2-hyovolemic shock : - definition , risk factors . - pathophysiology	Dr Wafaa

2	Wednesday 11/3/09	2-3	2-hyovolemic shock : - clinical manifestation - management (medical& nursing)	Dr Wafaa
	. .	3-4	Lab pacemaker (GA) Lab Sawn gans catheter (GB)	Miss/fatmah Miss / Afnan
3	Monday 16/3/09	3-4	PRESENTATION	
	Tuesday 17/3/09	2-4	Cardiac Arrhythmias -Introduction , normal electrical conduction, -Influences on heartrate and contractility -Analysis of ECG	Dr Gehan
	Wednesday 18/3/09	2-3	3- Septic shock , neurogenic shock and anaphylactic Shock : - definition - causes - management 4- multiple organ failure : -Management (medical & nursing)	Dr Wafaa
		3-4	Lab pacemaker (GB) Lab Sawn gans catheter (GA)	Miss/fatmah Miss / Afnan
4	Monday 23/3/09	3-4	PRESENTATION	.
	Tuesday 24/3/09	2-4	Cardiac Arrhythmias -Types of dshyrthmias : a-SA node : tachycardia , bradycardia b-Atrial tissue : AF, flutter	Dr Gehan
	Wednesday 25/3/09	2-4	Cardiac Arrhythmias -Types of dshyrthmias : c- AV node : blocks, V-tissue, V-tachycardia, V- fibrillation	Dr Gehan
5	Monday 30/3/09	3-4	Cardiac Arrhythmias -Effect of electrolyte disturbance on cardiac rythmia -Nursing process the patient with dysrhythmias	Dr Gehan
	Tuesday 31/3/09	2-4	- Acute respiratory failure -Definition , assessment ,manifestation ,medical Management ,nursing management - ARDS Definition , pathophysiology , assessment , diagnostic studies , management	Dr Nemaa

5	Wednesday 1/4/09	2-3	**QUIZ 1**	All Staff
		3-4	Presentation	
6	Monday 6/4/09	3-4	- Oxygen delivery , nutritional support , -Hemorrhage , pneumothorax	Dr Nemaa
	Tuesday 7/4/09	2-4	Ventilatory support , Mechanical ventilation Nursing care of the patient requiring ventilatory Support	Dr Nemaa
	Wednesday 8/4/09	2-3	Electrolyte and acid base balance A- electrolyte imbalances : 1- sodium (hyponatremia ,hypernatremia) 2- potassium (hypokalemia, hyperkalemia) 3-calcium &phosphate (hypocalcemia , hypercalcemia) 4-magnesuim (hypomagnesaemia ,hypomagnesaemia)	Dr Gehan
		3-4	Lab intra aortic balloon pump	Miss / Aisha
7	Monday 13/4/09	3-4	PRESENTATION	
	Tuesday 14/4/09	2-4	MID TERM EAXM	All Staff
	Wednesday 15/4/09	2-3	Electrolytes and acid base balance B- acid base disturbance : 1- acute and chronic metabolic acidosis base HCO3 deficit . 2- acute and chronic metabolic alkalosis HCO3 excess. 3- acute and chronic respiratory acidosis Co2 excess . 4- acute and chronic respiratory alkalosis Co2 deficit	Dr Gehan
		3-4	Lab Esophageal Tamponade	Miss /fatmah
8	Monday 20/4/09	3-4	Presentation	
	Tuesday 21/4/09	2-4	Cardiac surgery : -Nursing process awaiting cardiac surgery . - Care of pt after cardiac surgery . - Intra operative nursing management .	Dr Gehan
	Wednesday 22/4/09	2-4	Renal failure : 1- anatomy and physiology of urinary system . 2- acute renal failure : - definition , pathophysiology, types , phases - assessment and diagnostic studies - management (medical & nursing)	Dr Wafaa

9			**Mid Term vacation**	
10	Monday 4/5/	3-4	Presentation	
	Tuesday 5/5/	2-4	Renal failure 3-chronic renal failure : - definition , pathophysiology, clinical manifestation - assessment and diagnostic studies - management (medical & nursing)	Dr Wafaa
	Wednesday 6/5/09	2-4	Renal failure 4- dialysis : -types, principles , mechanism -vascular access - complications - management	Dr Wafaa
11	Monday 11/5/09	3-4	Renal failure 5- peritoneal dialysis : -types, indications -approaches , access - complications - management	Dr Wafaa
	Tuesday 12/5/09	2-4	Burn injury : systemic response , effect fluid And electrolyte , local response and extent Of burn , resuscitative phase of burn care, Emergency medical management	Dr Nemaa
	Wednesday 13/5/09	2-3 3-4	Quiz 2 -Management of fluid loss and shock -Nursing process of burn care in resuscitative Phase - Monitoring and managing potential Complications	All staff Dr Nemaa
12	Monday 18/5/09	3-4	Presentaion	
	Tuesday 19/5/09	2-4	- Acute and intermediate phase of burn care - Burn wound -Disorder of wound healing - Nursing process of burn	Dr Nemaa

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12	Wednesday 20/5/09	2-3	Neuro surgery: 1- Intracranial pressure : - , pathophysiology, causes . - assessment and diagnostic studies. - management (medical & nursing).	Dr Wafaa
		3-4	Presentation	
13	~~Monday~~ 25/5/09		~~Presentation~~	
	Tuesday 26/5/09	2-4	Neuro surgery: 2- Altered level of consciousness ; - pathophysiology, causes . - assessment and diagnostic studies. - management (medical & nursing).	Dr Wafaa
	Wednesday 27/5/09	2-4	Neuro surgery: 3- Brain tumor : - incidence ,pathophysiology , types . - assessment and diagnostic studies. - management (medical, surgical & nursing).	Dr Wafaa
14	Monday 1/6/09	3-4	Neuro surgery 4- intracranial surgery : - Approaches. - pre and post operative nursing care . - complications .	Dr Wafaa
	Tuesday 2/6/09	2-4	GIT bleeding and esophageal variceses	Dr Gehan
	Wednesday 3/6/09	2-4	Acute abdomen : - fatty liver . - care of pt with pancreatitis (acute & chronic) - abdomen trauma	Dr Gehan

Total hours : Dr Nemaa : 18 hours , Dr Wafaa : 18 hours ,Dr Gehan :15 hours

Teaching plan /second semester critical nursing 2008-2009————Coordinator DR Nemaa

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Appendix VII

Examples of Case Scenarios

Respiratory system

Objectives:

- To identify whether students are able to understand the normal anatomy and physiology of the respiratory system.

- To identify whether students are able to identify the patient's problem from the scenario and based on that describe how the patient will be managed.

- To understand how to manage patients with acute conditions.

Real world context

Hospital.

Scenario

Part1

Hassan, 42 years old, was admitted to the emergency department. He came with a history of sever shortness of breath, fever, chills, and agitation. When vital signs were checked, it was found that his blood pressure was 80/40mmhg, heart rate was 130 b/min, respiratory rate was 38 breaths/min and oxygen saturation was 84%. Within 20 minutes of his arrival, Hassan's condition had deteriorated. He became dyspneic, more agitated, confused and oxygen saturation dropped. Hassan was connected to a face mask with 100% oxygen.

Arterial blood gas was collected; the result showed that the patient had high CO_2 and low oxygen saturation. In addition, the pH was low and the HCO_3 was high. Blood was collected for CBC and U&E. The CBC result indicates that the patient had a high white blood cell count and a hemoglobin of only 9g/dL. The U&E result showed high urea; the blood sugar was 140mg/dL.

Immediately, the ICU doctor was contacted. Based on the signs and symptoms and medical assessment, the ICU physician decided to intubate the patient, admit him to the ICU and

connected him to the ventilator. The ventilation mode was set to SIMV/PS with respiratory rate 20b/min and oxygen rate 60%. A Foley catheter was inserted: the urine output was very low for the first 6 hours at 25 ml/hr.

After Hassan has been admitted to the ICU, routine laboratory investigations were obtained. This included CBC, ABG, U&E, INR, PT PTT, urine analysis, urine culture and sputum culture.

For the time being, the patient is on ventilation, on IV fluids of normal saline at 63ml/hr and on dopamine at 8 microgram/kg/min. The blood pressure is 100/58, respiratory rate is 24/min and oxygen saturation is 93%. The patient has very low urine output of 25ml/hr.

A-Discuss the case with your colleagues and identify the following:

5. **What is known about the problem?**

- From the case scenario?

- From your previous knowledge?

- From nursing knowledge?

6. **What is missing and what do you need to know?**

- What are the knowledge gaps?

- What information needs to be further researched?

7. **Prioritize the knowledge gaps**

- What information is most significant?

- What information is most useful to the group?

8. **Hypothesis/issues**

- What does it all mean - what is going on here? Summarize your findings.

- Describe your recommendations.

- Develop a plan to address the problem. (Nursing care plan).

B-Other questions

- Describe the normal physiology and anatomy of the respiratory system.

- Describe the normal respiratory mechanism?

- Paste a picture of a mechanical ventilator?

- Describe 4 common modes of ventilation? For each type describe the kind of patients that benefit from it.

- What do the following terminologies mean:
  1. Peak airway pressure (Pao).
  2. PEEP.

- Explain the common abnormalities you would find in the patient ABG.

Part 2

Objectives:

- Demonstrate knowledge of the patho-physiology and treatment of sepsis.
- Apply appropriate interventions to improve and maintain patient's condition'.

Scenario

Three days after admission, some of the laboratory tests were released. It was found that the patient is HIV positive, and sputum and urine cultures are positive for microorganisms. Early signs and symptoms and laboratory investigations rule out that the patient is suffering from sepsis.

Part 3

Objectives

- Explain effect of the unexpected illness on the patient and family.

- Demonstrate knowledge of how to empower and support families with crises.

- Describe legal and ethical issues could rise with this situation.

- To explore different strategies of dealing with patient's deteriorated condition.

Scenario

His wife is shocked with the diagnosis. She has 2 children and she is pregnant, she claimed that she couldn't believe that her husband has AIDS. She said that she is worried about herself and her kids that they might be infected as well.

Renal failure

Objectives:

- To identify whether students understand the normal anatomy and physiology of the renal system.

- To understand problems or deficiencies that will occur as a result of chronic renal failure.

- To understand how to manage patients with chronic renal problems.

- To identify whether students recognize renal failure patients through blood tests

- To address acute problems that could result from bad management of chronic renal failure.

- To understand how to manage CRF patients with emergency conditions.

Real world context

Hospital.

Scenario:

Part1

Ali is a 58 year old male complaining of diabetes and hypertension and on medication for more than ten years. Based on the investigations, it was found that Ali's kidney function was very poor and he was diagnosed with chronic renal failure. The doctor informed Ali that he will need dialysis later. Ali is married with 6 children: he is working in a governmental institute. When Ali was informed about his condition he was very sad and worried. He asked the doctor whether his condition would affect his work and role as a father. Ali works from 9 am until 5pm five days a week.

- Ali knows nothing about renal failure. If you are a nurse who works in the nephrology unit and Ali has been referred to you for educational purposes what do you need to tell Ali about?

- Ali is also referred to you to give him information about dialysis. What is the essential information that he needs to know?

- What are the surgical/medical preparations that Ali needs before starting dialysis?

Part 2

A year later, Ali, started hemodialysis. Before one of the dialysis sessions, the nurse collected a blood sample from Ali for CBC and sent it to the lab. An hour later, whilst Ali is connected to the dialysis machine, the hemoglobin result arrived - it was 5.9.

Two weeks later during dialysis, Ali became dizzy and nauseated. When the nurse checked his blood pressure she found it to be very low at 84/48mmHg.

Part 3

One day, Ali arrived at the Emergency room complaining of sever shortness of breath. Ali's condition became worse. He collapsed in the emergency room. The code team was called and Ali was resuscitated. Ali was intubated, and after intubation endotracheal suctioning was done. It was observed that fluids were coming from the lungs. Ali was immediately admitted to the ICU and urgent hemodialysis was started. Ali's wife was asked about what happened: she said that he missed the last dialysis session and he was feeling thirsty and drinking a lot of water.

Scenario 3

Nervous system

Objective:

- To understand the emergency management of head injury patients.

- To understand the patho-physiological problem lead to increased intracranial pressure.

- To discuss the medical, surgical and, nursing managements of patients with head injury complications.

Scenario

Mr Saeed is a 25 year-old man who was involved in a road traffic accident (RTA). Saeed was in good health until he was hit by a car whilst crossing the road. The emergency medical team (EMT) arrived within 20 minute of the accident. The initial assessment showed loss of consciousness. The GCS score was 11 out of 15, respiratory rate was 8 breaths/minute and oxygen saturation was 89%. Cervical support was applied and the patient was intubated immediately. After the patient had been stabilized he was transferred to a trauma center. Urgent CT for the head, chest and abdomen were ordered. Blood was collected for investigations.

Saeed's father arrived at the center and medical history was obtained from him. According to the father, his son did not have any previous medical problems. Regarding the family and social history, Saeed lives with his family, he is single, and smoking since he was 18. His mother is 55years old with diabetes and father is 64 years with hypertension. He has one sister and one brother, both are healthy.

The CT scan result arrived, it was negative and blood investigations were all normal. However, the hemoglobin was 8.0g/100 ml and the hematocrit was 28% (normal: 42% to 52%). The patient was still not responding.

The physical examination indicated the following:

General: well nourished male, eyes closed. Vital signs Bp 188/66mm Hg, HR 45beats/min/, RR 16 breaths on mechanical ventilation, O$_2$ 93%.

Head, eyes, ears, nose, throat: Head has multiple lacerations, right temporal contusion, orbits edematous with raccoon eyes, no obvious skull depression, and no obvious neck injuries.

Chest: Bilateral chest expansion, coarse bronchi throughout.

Cardiovascular: normal.

Gastro intestinal: no bowel sound, abdomen distended.

Skin: skin ecchymosis throughout the body.

Neurology: patient is not responsive.

Motor: moves all extremities only with deep painful stimuli.

Cranial nerves: pupils symmetric and responsive to light, facial symmetry, tongue appears midline, no gag reflex.

Clinical impression: a 25 year old male patient admitted to the ICU with multiple fractures and acute head injury. The patient's femur is fractured and require immediate surgical repair. The patient was under close monitoring. Hemoglobin was low, two PRBCs were given. Mechanically ventilated, chest x-ray showed aspiration pneumonia.

On day 3, during neurological assessment, the nurse discovered that the patient's left pupil to be fixed and dilated. The house officer was called and an urgent CT scan was ordered. The CT revealed left temporal hemorrhage with 4mm midline shift and mild edema. An intra-ventricular device was inserted for monitoring ICP and the patient was taken for decompressive surgery. Initial mean ICP was 43mmHg. During the surgery, the patient received many therapies, including Mannitol infusion and mild hyperventilation. The ICP after surgery was 12mmHg. Nitroprusside was started in the theatre for managing refractory hypertension and it was continued to maintain the Bp less than 160mmHg.

On day 4, the patient experienced episodes of increased ICP and developed tonic colonic seizure activity. He responded to an urgent doe of diazepam 5mg. Another dose was given after 5 minutes, after that the seizure subsided. CT was done, no hemorrhage. However, the ICP was 35mmHg and required aggressive management.

On day 5 the ICP continued to be elevated at 25mmHg. The patient developed hypoxia and hypercapnia as shown in the ABG. The patient was managed by cisatracurium and fentanyl to maintain proper sedation.

By day 6 the patient's ICP was maintained at 10mmHg, mannitol was discontinued, acute lung injury was improving. CT scan revealed no further hemorrhage or shift. The IVC device was removed.

Discuss the case with your colleagues and identify the following:

9. **What is known about the problem?**

- From the case scenario?

- From your previous knowledge?

- From nursing knowledge?

10. What is missing and what do you need to know?

- What are the knowledge gaps?

- What information needs to be further researched?

11. Prioritize the knowledge gaps

- What information is most significant?

- What information is most useful to the group?

12. Hypothesis/issues

- What does it all mean-what is going on here? Summarize your findings.

- Describe your recommendations.

- Develop a plan to address the problem. (Nursing care plan).

Appendix VIII

Structured reflective journal form

Structured reflective journal form

1. Describe the session of this week?

- What happened

- What you did?

- Is there anybody was involved with you?

2.What did you learn from this session, and how you learn it?

----

3. How do you feel about this session?

- Are there any difficulties experienced?

_____
_____
_____
_____
_____
_____

- How you dealt with it?

_____
_____
_____
_____
_____
_____
_____
_____
_____

4. How do you evaluate the INTERVENTION session?

- Advantages.

_____
_____
_____
_____
_____
_____
_____
_____
_____

- Disadvantages.

5.What would you like to change? Is there a new thing you want suggest?

Appendix X

Trigger guide

Trigger description:			

Statement of what known from the case scenario.
 	
• From the
  scenario?
 	
• From your
  previous
  knowledge?
 	
• From
  practical
  knowledge
	What is missing and what do you need to know?
	
	• What are the
	  knowledge
	  gaps?
	
	• What
	  information
	  needs to be
	  further
	  researched?
		Prioritize the knowledge gaps
		
		• What
		  information
		  is most
		  significant?
		
		• What
		  information
		  is most
		  useful to the
		  group?
			Hypothesis/issues
			• What does it all
			  mean-what is
			  going on here?
			  Summarize your
			  findings.
			• Describe your
			  recommendation
			  s.
			
			• Develop a plan
			  to address the
			  problem.

Nursing Care Plan

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