Facilitating Learning of Pre-Registered Nursing Students in Fundamentals of Pharmacology

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The purpose of this study was to describe how learning can be facilitated amongst pre-registered nursing students in the English degree program at Laurea University of the Sciences by planning, implementing and evaluating classroom learning sessions. This study was a part of the project Facilitating Learning of Pharmacology and Medication in the Degree Program in Nursing, whose aim was to develop curriculum implementation of pharmacology and medication studies in the nursing degree program.

This project was an action based project and implemented in line with the curriculum placed by Laurea University of Applied sciences under the study unit MEDICAL ASSESSMENT AND THERAPEUTIC METHODS. The participants included the SNG10SN nursing students in the English degree program at Laurea University of Applied Sciences.

The study method was qualitative and data was collected using evaluative feedback forms filled out on two separate occasions by the students at the end of the implementation period. The findings revealed that learning can be facilitated when students have a competent and able facilitator providing information; when they are a part of a supportive learning environment; when the content and timing of the lectures are consistent and when the learning materials provided by the facilitator are consistent.

The findings reveal that there is a need for a review of the curriculum in the English nursing degree program at Laurea and a need of developing a curriculum that would enhance and stimulate learning in medication and fundamentals of pharmacology.

Keywords: Facilitating learning, pharmacology, nursing education,
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1 Introduction

The responsibilities given to nurses grow more and more with each passing year. With Laurea University of Applied Sciences (UAS), among other universities nation- and worldwide offering programs for nurses to be able to prescribe certain medications, the demand for nurses to understand basic pharmacology is much higher than before. Nursing education has changed drastically over the past decades and the demand of knowledge from nurses after graduation has proportionally increased (Morrison-Griffiths, Snowden, Pirmohamed, 2002). Knowledge of nurses, especially regarding medication and pharmacology is on the rise and nurses are being held responsible for their institution of learning’s curriculum regarding the teaching of medication and pharmacology. Manias and Bullock (2002) conducted a study which revealed that graduate nurses as well as nurses who have been in the field for a number of years had a lack of understanding in pharmacological concepts.

The focus of this paper is to discuss how pre-registered nursing students can facilitate their own learning in Fundamentals of Pharmacology. This study aims to plan, implement and evaluate learning sessions at Laurea UAS. Because of this disconnect between learning pharmacological concepts and the demand of knowledge from graduate nurses regarding medication and pharmacology, the issue of more structured and innovative teaching regarding pharmacology in school will also be addressed.

Pharmacology is the branch of health care sciences that involves the study of medicines or drugs. In other words, pharmacology is the study of drugs and how they work in the body. Learning can be considered in the substantive or in action. As the substantive, learning is considered to be knowledge or skills attained. In action, learning is the process of acquiring skills or knowledge (Brockbank & McGill, 16). Nurses have been involved in the management of medication since the beginning of the nursing career (Downie & Mackenzie & Williams, 2008). With this involvement in medication comes great responsibility and nurses are receiving everyday more and more responsibilities that go along with medications. Likewise, the requirements of knowledge expected from nurses in regards to medication and pharmacology is gradually increasing, and many studies have shown that the knowledge that pre-registration nurses receive in pharmacology is inadequate for the responsibilities they have in the field (Bullock & Manias, 2002; Morrison-Griffiths et al, 2002).

As there is a discrepancy between the amount of knowledge obtained at school and the amount of knowledge required in the field, the issue of teaching pharmacology, and allowing the students to facilitate their own learning needs to be addressed (Lynn & Bath-Hex all & Wharrad, 2008). There has been a shift in the pre-registration nursing training education from a medical model to a social model, with more emphasis on caring rather than curing. With this shift from biological sciences to more social sciences, and the focus being on holistic
beings, biological science teaching has taken a back seat to more of the social teachings and has caused a gap in the knowledge of holistic nursing care and medicinal and pharmacological knowledge (Morrison-Griffiths et al, 2002). It is indeed troublesome that as nurses, the primary health care professionals involved in the administration of medication, that the knowledge is not up to par (Morrison-Griffiths et al, 2002).

The facilitation of learning of fundamentals of pharmacology was aimed at contributing to acquiring new knowledge through students’ skills and abilities in nursing. This project sought to develop a curriculum implementation of pharmacology and medication studies in the English degree program in nursing at Laurea UAS. The implementation of the course, Fundamentals of Pharmacology, was conducted by me, where I created, implemented and evaluated learning sessions at Laurea UAS.

The participants of this study were the second year nursing degree students of the year 2010 (SNG10SN). The study was carried out using qualitative methods; non-structured questionnaires to gather data, and inductive content analysis for analyzing the data. These methods are best suited when former knowledge or studies is inadequate to describe the phenomenon (Elo & Kyngäs, 2007).

2 Pharmacology

Pharmacology is the study of drugs and how they work in the body. It includes the study of pharmacokinetics, or a drug’s movements in the body (absorption, distribution, metabolism and excretion), pharmacodynamics, the drug’s actions on the body (biochemical/physical effects and mechanism of action of a drug), and pharmacotherapeutics, or how drugs are used to treat and prevent diseases (Lippincott, Williams & Wilkins, 1). As a nurse, it is important to study pharmacology for the purposes of safe medication administration, growing responsibilities of nurses, giving guidance to patients and significant others, keeping in accordance with health laws and lastly, increasing knowledge helps to reduce errors (Downie, Mackenzie, Williams & Hind 2008, 10).

Personally, as someone who has studied both pharmacology and nursing, I do not feel that it is the nurse’s responsibility to know everything about medication and how it works. It is necessary, however, to know enough to be able to give guidance to patients or significant others and know where to find information pertaining to medicine and how its functions in the body. Nurses have more responsibility globally, as well as in Finland, prescribing nurses are one example, and with these growing responsibilities, the education nurses receive before they are registered must accommodate the growing demand for nurses to possess more pharmaco-
logical knowledge. This chapter aims to explain Pharmacology and its aspects and how it is related to nursing. The nurse’s role in pharmacology, the concept of a prescribing nurse as well as the pharmacology education in the pre-registered nursing program will be discussed.

2.1 The nurse’s role in pharmacology

As a nurse, there are many roles he or she may need to fulfill in the caring of a patient or client. In pharmacology, this concept is no different. According to Downie et al (2008, 20), the nurse’s role in pharmacology is a professional role requiring knowledge, skill, judgment and commitment. The nurse is responsible for the management of medication in the form of safe and efficient administration, monitoring clients for desired and undesirable effects, discharge planning, giving guidance to the client and/or significant others, ensuring patient compliance, and especially home care medicine management (Downie et al 2008, 21).

Nurses have the most auspicious placement in the health care field for the promotion of safe and effective medication management (Bullock & Manias, 2002). Nurses have contact with all members of the multidisciplinary team in the health care field, more notably, doctors and pharmacists. This interaction creates a favorable environment for the nurse and the client to be able to comfortably discuss a new medication routine and it is the nurse’s responsibility that he or she is confident in his or her knowledge of pharmacology to be able to give proper guidance to the patient. As drug administration is one of the primary roles of the nurse in pharmacology, it is important for nurses to understand the pharmacotherapy of a drug: for what purpose it is given, what are the therapeutic effects, side effects as well as interaction with food and other drugs, whether prescribed or over-the-counter. With more and more medications being readily available, pharmacology is an essential part of nursing (Morrison-Griffiths et al, 2002). Drugs may have more than one indication or action, depending on dosage and drugs may have different effects or durations depending on the route a drug is given. Nurses must be responsible for knowing those different dose-dependent indications and route-depending effects on a patient to ensure the patient’s safety.

Patient safety and compliance are also a major role of the nurse in pharmacology. When nurses follow the “Five Rights of Drug Administration”: giving the right drug to the right patient in the right dose and route of administration at the right time, they ensure the patient’s safety and compliance have been met (Lehne 2010, 59). Nurses must also be ready to respond to any adverse reactions or interactions between the drug and the patient. Nurses must know about the patient’s medical history and drug usage and be the advocate for the patient when a doctor is prescribing a new medication course of therapy. When advocating for the patient, the nurse must use pharmacology knowledge to identify high-risk patients.
with kidney or liver dysfunction or allergies and assess the patient’s ability to follow the medication regimen on his or her own (Lehne 2010, 67).

Nurses also play a part in evaluating and promoting therapeutic effects of a drug. This is a part of medicine management which is the nurse’s major role in pharmacology. The nurse should know if a drug is doing the desired therapeutic effect in addition to the rationale behind starting the medicine treatment. If the desired effects are not reached, the nurse must act quickly and provide an alternative therapy (Lehne 2010, 72). The nurse is also responsible for promoting patient compliance. Drugs must be taken correctly and the nurse must assess a patient’s ability to follow protocol for self-medicate at home. The nurse must also promote and implement if necessary non-pharmacological measures to enhance therapeutic effects, for example, breathing exercises, physical therapy, and/or lifestyle changes (Lehne 2010, 76).

Finally, the nurse’s role in pharmacology involves patient education. Using all of the aforementioned aspects of pharmacology in nursing, the nurse is responsible for guaranteeing that the patient is fully educated about the new medicine schedule. Nurses should be able to describe the name and classification of a drug, the dosage and schedule, paying close attention to if a drug is on an as needed basis, the route of administration also giving guidance on the technique if needed, the expected therapeutic response and duration, non-pharmacological methods of enhancing a drug’s therapeutic effects, the duration of the entire treatment, the method of drug storage, symptoms of major adverse reactions and measures to minimize harm and discomfort, major adverse drug-drug and drug-food interactions, and who to contact in the event of therapeutic failure, and finally severe adverse reactions or severe interactions (Lehne 2010, 80).

When a nurse keeps in mind his or her role in pharmacology, he or she will have the ability to discern what sort of education is needed in order to fulfill those roles and responsibilities expected of him or her. Writing prescriptions as a nurse and keeping up with education requirements becomes a more feasible goal to attain in one’s professional career.

2.2 The prescribing nurse

July 1, 2010, Finland passed a new legislation giving nurses a limited right to prescribe medication to patients in their care (MINISTRY OF SOCIAL AFFAIRS AND HEALTH). While this prescribing right applies to medications in certain medical conditions and has pre-requisite requirements, this new legislation gives more responsibilities to nurses. In the United States, the United Kingdom and Australia, nurse practitioners have been given the right to prescribe certain medications previously (Lynn, Bath-Hextall, Wharrad, 2008). However, the prescrib-
ing of medicines by nurses is a significant development in the professional role (Downie et al. 2008, 67).

Most patients in specialized care will receive medications prescribed on an individual basis; because of this, it is beneficial to the patient as well as the health care facility to allow nurses to be able to prescribe certain medicines under certain medical conditions (Downie et al. 2008, 69). Nurses in Finland play a large part in preventing hospital admissions by providing home care to clients with long-term conditions in the community. It was suggested to allow nurses the ability to prescribe medications within their scope of practice to reduce the number of visits to a doctor for the refilling of an existing prescription as well as increase access to medication (MINISTRY OF SOCIAL AFFAIRS AND HEALTH). The number of prescribing nurses is expected to increase over the next ten years (MINISTRY OF SOCIAL AFFAIRS AND HEALTH).

According to Downie et al. (2008, 72), the use of patient group directors (PGDs) is beneficial to health care facilities and prescribing nurses by providing a support system for authorized health care professionals to prescribe, supply and administer medicines in an identified clinical situation without the need of individually processed prescriptions for each individual patient. The use of PGDs will ensure that the prescribing nurse does not act above his or her capabilities and thereby be in breach of the law. This is also beneficial to ensure nurses do not feel overextended in their responsibilities and have problems coming to terms with the increased responsibility of prescribing.

In Finland, there are concerns for the amount of time and money spent developing the resources needed for nurses to prescribe medication independently (MINISTRY OF SOCIAL AFFAIRS AND HEALTH). Responsibility is laid upon the shoulders of the senior medical, pharmacy, and nurse managers to make certain adequate training, education and support is given to the nurses who will be undergoing the prescribing training (Lynn et al., 2008). Training takes time and money and trainee nurses are heavily reliant on supervision from doctors, regardless of previous education. Prescribing decisions are largely idiosyncratic, relying on validation from colleagues to manage uncertainties (MINISTRY OF SOCIAL AFFAIRS AND HEALTH).

Reducing errors is also cause for concern for Finnish health officials. Nurses are still making mistakes in the field when only focusing on administering the medication; these errors are bound to increase when factoring in prescribing medications (MINISTRY OF SOCIAL AFFAIRS AND HEALTH). This leads to the need for better education in the nursing program as well as more supplemental education after graduation to certify that nurses have the proper knowledge and skills needed in pharmacology so fewer mistakes are made. Nurses with the authority to make prescriber decisions must use to their full ability their knowledge of actions and uses of medicine as well as their skills in observation and medicine management (Downie
et al 2008, 76). The Finnish National guide for pharmacotherapy in social and health care (2006) states “Pharmacotherapy is a health care activity that is carried out, as a rule, by health care professionals with training in pharmacotherapy and under their responsibility.” As such, they stress the need for further development of attitudes and education based on clinical experiences to increase nurses’ knowledge as well as confidence in pharmacology.

The advancement of nurses’ responsibilities especially in medication management by the legalization of nurse prescribing gives rise to the need for more education of pre-registered nurses (Lymn et al, 2008). Knowledge of drug’s mechanisms of action, adverse reactions, therapeutic effects as well as classification will take care that prescribing nurses make fewer mistakes on the field and save the health care facilities in time and money (Downie et al 2008, 76).

2.3 Pharmacology education in nursing programs

Over the past thirty years, nursing education has changed considerably and the demand for knowledge has proportionally increased (Morrison-Griffiths et al, 2002). The Finnish National guide for pharmacotherapy in social and health care (2006) places great importance on the development of nursing education to encompass the increasing demands of knowledge on nurses. Knowing and understanding basic pharmacological principles of pharmacodynamics, pharmacokinetics, pharmacotherapeutics, clinical decision-making and patient education while in the pre-registration phase of nursing education creates a foundation upon which nurses can build and expand into more demanding aspects of nursing, such as prescribing (Bullock & Manias, 2002). A common theme throughout all of the source material was the fact that pharmacology is an important part of the pre-registration nursing curriculum.

Content taught in pharmacology lectures in nursing programs is pretty standard worldwide, with the majority of the focus being on record keeping and medicine administration (Morrison-Griffiths et al, 2002). The nurse’s major role in pharmacology is medicine management so this phenomenon does make sense; however, it is still lacking in the essence of pharmacology: pharmacokinetics, pharmacodynamics, and pharmacotherapeutics. Manias and Bullock (2002) mention that nurses must acquire knowledge and understanding of the scientific principles involving medicine in addition to the complexities of medicine management to cater to the ever changing needs of the patient. It is having a sense of well roundedness in pharmacology and embracing the scientific aspects of the course in addition to the practical aspects which will separate the nurses who can cope with their added responsibilities from the nurses who suffer from insecurities involving medication. In Laurea UAS, the focus was to find the
balance between humanistic pharmacology and biological or clinical pharmacology to achieve the most out of each learning session.

Nevertheless, content being important, timing of pharmacology lectures is also key in making sure nurses fully grasp all of the biological and humanistic aspects of pharmacology. According to Manias and Bullock (2002), the majority of pharmacology lectures is held in the second year of a three year nursing program. This would be optimal especially in a UAS system because the focus of the studies is to harmoniously blend theory and practice together. After a year of theory, the first clinical rotation is already underway and students would have a first-hand look at medicine management, and clinical pharmacology. Moreover, on average, there are at least twenty lecture hours for the entire course (Bullock & Manias, 2002). At Laurea UAS, unfortunately there is no consistency in when during the degree program pharmacology lectures take place. I had my lectures near the end of my second year with three clinical rotations already underway. The lectures took place for this study during the second year of the nursing studies with one clinical rotation completed. Finally, the lectures for the last year students (SNG11SN) took place during their first year with no clinical experience and very few lectures of anatomy and physiology accomplished. For all three student groups, there were at least twenty hours of contact lessons.

In addition, style of lecture is an important aspect of pharmacology lectures taught during the nursing program. Morrison-Griffiths et al (2002) state the most common types of teaching methods were lecture, clinical practice, seminar, tutorial, discussion, workshop, problem-based learning, self-directed learning, and case study styles. Teaching style would make sure the lecturer has prepared the nurses of the future to fulfill their roles as medicine managers in medication administration. Teaching methods and creating variety in the different methods used thought the course would also ensure that each student who may have different ways of learning from each other would receive information in a way that is tangible for that student to be able to reflect and apply the information learned. At Laurea UAS, the focus of each learning session is primarily to promote self-directed learning, or for the students to facilitate their own learning; however, the most commonly used teaching method throughout the institution is the traditional lecture style. The second most commonly used style of lecturing was self-directed learning through group work facilitated by the instructor.

Morrison-Griffiths et al (2002) noticed a shift in nursing education from the biological sciences to humanistic sciences all for the sake of holistic nursing. Bullock and Manias (2002) state the hours used for the biological sciences have been decreased in favor of a more psychosocial perspective of nursing. In their opinion, focusing more on ‘caring’ rather than ‘curing’ has caused the nursing education program more harm than good and thereby created a sense of “incomplete holism” in the nursing education. In Laurea’s curriculum for the nursing degree
program in English, the proportion of humane sciences to biological sciences is unbalanced leaning more towards the humane sciences for the sake of holistic nursing and caring for the patient. According to Bullock & Manias (2002), there is a theory-practice gap in the pre-registered nursing program due to the lack of reinforced theoretical knowledge in the clinical placements, so the students who learn theory in lectures, have no place to practice that theory at the rotations. Because of this phenomenon, students are quick to forget the theory they’ve learned in the nursing program, regardless if it was adequate or not.

3 Facilitating learning

Learning may be described as a permanent change in behavior over time which may include many observable activities and internal processes such as thinking, attitudes and emotions. Facilitating learning, where the teacher takes on more of a role of a facilitator, encourages students to take a more active approach in their learning, thereby becoming more responsible for their learning (Burns 1995, 10). In the last decades, nursing education, as many other fields, has undergone numerous changes in the curriculum to meet the needs of a rapidly changing society (Morrison-Griffiths et al, 2002). These changes have brought about a new affinity for psychosocial aspects of learning and the term facilitator was given to lecturers. Facilitating involves a mutual respect and relationship between the facilitator and learners characterizing it as an essential aspect of meaningful learning. Facilitating learning activities involve more than giving learners instructions or directions as in instructional learning (Dunn 2002, 13).

Facilitators and learners collaborating, sharing experiences through critical reflection creates learning that results from an innate desire for personal development and self-direction. Learners taking responsibility for their own learning is a critical aspect of facilitating learning. Learning is an integral part of social practice where learning, thinking and knowing are active parts of the relationship in people in the world as opposed to static needing to be internalized (Dunn 2002, 18).

Numerous and various theories exist on the process of learning and how a learner can make good use of processes involved in learning using his or her own strengths and abilities. This section aims to describe two major theories in learning, constructive learning and reflecting learning. This section will also discuss how learning can be evaluated

3.1 Constructive learning
According to Thanasoulos (2000, 42), constructive learning is defined as learning reflecting on our own experiences, which allows us to construct our own understanding of the world we live in. We each make our own rules and models which are then used to identify with our own experiences. Learning is thereby defined as the process of adjusting our own mental models to acclimatize new experiences. The fundamental basis of learning under this theory is to discover; so, understanding is discovering and understanding is built step-by-step through active involvement.

Brandon & All (2010) define constructive learning as a process by which learning is constructed upon previous knowledge thereby making learners active creators of their own knowledge. In their point of view, constructive learning is based on four assumptions. 1) New knowledge is based on previous knowledge; 2) information assimilated and accommodated supports cognitive development and the production of new constructs; 3) learning becomes the process of invention of, for example, frameworks and critical thinking skills and 4) meaningful learning arises from reflection and linking new knowledge to previously existing knowledge.

Constructive learning pays close attention to the fact that learners have different perception and understanding levels. Learners have equal opportunities to share differing experiences and ideas for the sake of clarifying thoughts which may be confusing to other learners. In this way, learners who may or may not be thinking in the same way may learn new philosophies in ways which are meaningful to them. As such, constructive learning plays a major role in nursing education. Learning, acquired from the learner’s own mental construction, matches new ideas against readily available information and establishes meaningful logic as opposed to knowing facts to be digested and regurgitated later. Constructive learning allows learners to build their own concepts and parent their own critical thinking skills to find solutions to problems thereby enhancing their critical thinking and decision making skills (Thanasoulos 2000, 46).

Nursing is a life-long profession; as such nurses are expected to continue learning throughout the entire nursing career using critical and reflective thinking skills. Students and nurses alike are required to develop life-long learning skills akin to self-critiquing, self-directing, information synthesizing, concept linking, and critical thinking skills. In order for these skills to be attained, an active learning approach where the teacher acts as a facilitator is needed. The facilitator allows for the learners to make a connection to what they are already learning to what they already know and apply that knowledge to various contexts and understand the interrelations between concepts (Brandon & All, 2010).

Clinical nursing education is the ideal environment for constructive learning to thrive, where real meaning of facts is linked to experience. It’s important to make use of this learning
method, especially in nursing education because it embraces the students’ approach to learning in which students make active use of knowledge, connect it with prior knowledge and construct personal meaning (Thanasoulas 2000, 46). Providing stimulation, motivating learning experiences in a real world context to facilitate learning remains the principal role in constructive learning.

3.2 Reflective learning

Reflective learning can be defined as learning which builds upon the constructionist approach and reflects upon past experiences creating transformational conditions of learning (Brockbank & McGill 2007, 62). The learner is able to be effective in his or her environment, where development of the person is an aspiration and the learner is able to be critical in relation to the differing aspects of knowledge, self and the world. In essence, the learner is able to be reflexive about how he or she learns (Brockbank & McGill 2007, 63).

Reflective learning has become increasingly important in higher learning facilities and especially in nursing education. In these areas, being reflective is influential and higher education seeks to develop reflective skills (Bourner, 2003). According to Brockbank and McGill (2007, 67), transformational or critical learning requires conditions which allows for the learner to reflect upon his or her learning with others. They claim that the ability to become a reflective learner or shifting across paradigms of knowledge and self requires the ability to be able to reflect what’s known, felt or acted. Reflecting alone is necessary, but not enough as we tend to deceive ourselves and be unaware of certain perspectives. Because of this, it is helpful to also reflect as a group.

Reflective dialogue is an essential aspect to reflective learning. Reflective dialogue is interaction between the learners with themselves and the learners with the teachers where differing experiences and perceptions are shared (Brockbank & McGill 2007, 70). The teacher relates differently than the students to a particular subject and becomes a facilitator of learning, enhancing the trust relationship between the facilitator and the learners. The focus then becomes the students’ learning and how they understand or relate to a certain concept (Brockbank & McGill 2007, 72). Critical thinking, which is essential to all aspects of learning, can be easily recognized when assessing the skills obtained through reflective learning (Bourner, 2003). The facilitator is responsible for creating the conditions for critical and reflective dialogue and learning until the learners are comfortable with the process on their own (Brockbank & McGill 2007, 72-73).
Even more important than reflective dialogue in reflective learning is reflection. Brockbank and McGill (2007, 10) define reflection as the process by which an experience, whether by thought, feeling, or action, is brought into consideration currently and creating meaning and conceptualization from that experience to look at other things differently than what they are. Reflection is comprised of four major components: relationship, dialogue, process and personal stance. Relationship is defined by the facilitator and the learners as one of trust, openness, and guidance. A set of intrinsic and extrinsic factors contribute to the student-teacher relationship and affect the learner’s motivation to learn. Dialogue, which is the interaction - whether verbal or nonverbal -, is a key element in reflection, and also in learning. Dialogue which is reflective encourages learners to explore their sense of self and their perception of their world, thus allowing the learner to challenge their perceptions. Dialogue can be internal or external. Recognizing that reflection and learning is a process is also essential to achieving higher learning, whether in a diploma, undergraduate, masters, or doctoral program. Every lecture has a purpose for being and each task and how the task is achieved arises from the purpose of the lecture. Finally, a personal stance, which is part of the process, but also a concept in itself, involves the position one takes in life. Since reflection and learning is subjective, having and knowing your position in life is imperative to furthering the process of reflective learning (Brockbank & McGill 2007, 10-15).

3.3 Evaluation of learning

Evaluating learning is the process by which the increase in knowledge is measured. For learning to be effective, it must be evaluated and assessed to determine if the needs or purpose of the learning process were achieved (Bourner, 2003). Evaluation allows for the critical question to be asked and answered: have the goals and objectives of the teaching session been met? The efficacy and quality of the facilitation of learning can be improved through the evaluation of the students’ learning. Constructive learning demands that evaluation becomes a continuous process and the evaluation of outcomes is intended to represent new meaningful building blocks that have been transformed by the process of learning (Thanasoulas 2000, 42). Reflective learning demands that feedback is provided to determine that students have developed the capacity to learn through reflection. It’s hard to know if a specific course is doing its intended purpose unless reflective learning is assessed (Bourner 2003).

Evaluation assesses individual achievement to satisfy external requirements and provides information that can be used to improve the teaching and learning session and documents accomplishments or failures. Evaluation may provide feedback and motivation for continued improvement for learners, faculty and innovative curriculum developers (Thanasoulas 2000, 50). Evaluation of learning is often used in higher education institutions from upper manage-
ment to students and its main purposes serve to stream a continuous line of improvements for the institution as well as the continuous monitoring of results (Bourner, 2003). To ensure that the important questions are answered and the relevant needs met, it is necessary to be methodical in designing a process of evaluation.

Evaluating the learning of a larger group of students may present itself to be challenging. A clear and effective method of evaluation must be chosen in order to create a concrete and precise understanding of the students’ learning experiences. For the purpose of intensively and practically evaluating a large group of students, the use of questionnaires is in use which may be open or closed depending on the intention of the evaluation. Open or unstructured questionnaires offer a deeper insight to the students’ knowledge and allow for new knowledge about a particular subject to arise (Oermann & Gaberson 2009, 20). Questionnaires as a method of evaluation are a fast and easy way by which a group may be assessed anonymously thereby encouraging honesty and transparency amongst the participants. In addition, questionnaires offer information which may be analyzed at a later point to seek answers to problems and take action in development (Oermann & Gaberson 2009, 22).

Students’ knowledge is the first source of evaluation. As the intended beneficiaries of learning sessions, students are in a unique position to help facilitators in the evaluation process. If, for instance, the lecturer would like to know more information pertaining to the style of lecturing, the content of lectures, and whether or not learning was supported, it is far better to ask the students themselves. Students can be issued questionnaires to gather appropriate information with regards to what was taught. In this manner, the lecturer can confidently conclude that the students understood the teaching session if the students are able to give honest and open answers to questionnaires as well as graded examinations.

Self evaluation is also a means of evaluating students’ learning experiences as well as the facilitator’s skills and knowledge. I, as the facilitator, am able to evaluate my own competencies on the basis of student evaluations and identify the need for improvement and level of success for each learning session implemented. I am also able to think critically and reflectively, using past knowledge and experiences and relate those experiences to the current activity of attempting to facilitate learning and assess if the needs of the students have been met. In a supportive learning environment, the facilitator is able to plan and develop strategies of successfully achieving the outcome of learning on the basis of feedback (Oermann & Gaberson 2009, 49).

Self-monitoring is another important aspect of evaluating the teaching and learning session. This is done typically semi-consciously and is in most cases an intrinsic process. One portion of the mental activity during self evaluation is focused on “how well is the session going?”
“Are the students following me?” “Are they interested or are they bored?” Self evaluation is important in that it is immediate and constant and allows for quick adjustments when necessary. When focusing the thoughts and questions around certain subjects such as content, timing, and/or style and recording those thoughts concretely, self evaluation can be very effective in assessing the learning of students as well as the facilitating skills of the teacher.

4 Planning the study

Action research has been widely used in educational research throughout the last decades to improve teaching and learning due to the cyclic process of action and research. It has been categorized as participant-driven and reflective, a collaborating system leading to change and development. Action research has been seen as a way of improving practice in addition to knowledge; it generates theory which is grounded in action (McNiff, Lomax & Whitehead 1996, 3).

Action research aims to contribute to the practical concerns of society, groups, and individuals in an immediate problematic situation with the general goal of science central. Action research also sets the goal of developing the improvement of people facing problems by collaborating with a mutually acceptable ethical framework (McNiff et al. 1996, 6). Taking these goals into consideration, it is best that this thesis project is best carried out by action research in order to effectively describe the facilitation of learning in fundamentals of pharmacology.

Several researchers, including McNiff et al (1996) and Ezzy (2002) have described action research in numerous ways with a variety of diagrams and figures depicting the processes involved. McNiff et al (1996, 14) claim the best way to depict the complexity of action research is to use a spiral to describe the cycle of action research. Figure 1 is their representation of the spiral cycle which comprises action research. This thesis has adopted the action based research approach of McNiff et al (1996) as a guide for the research process from identifying the situation to the evaluation of the findings. Figure 2 is my representation of their approach to action research. Identifying the problem is represented by the use of literature to develop the theoretical background of the thesis. This also includes the purpose and research questions as well as the planning of the action.

Data gathering was systematic and logical in relation to the evaluation. In this project qualitative research methods were used to gather useful and trustworthy data for the next stage of the process, interpreting the data. This focused on analyzing data in its raw stage and transforming it to a more meaningful form and then presented. After the data is interpreted,
it's evaluated upon which is represented by the discussion of the findings. The last stage of reflection is not touched upon in this thesis, and will be left for further curriculum development.

Figure 1: Spiral depiction of the action based research process. McNiff et al 2009 page 14
4.1 The purpose of the study and research questions

This study aimed to describe how learning can be facilitated in fundamentals of pharmacology of pre-registration nursing students through planning, implementing and evaluating learning sessions in a classroom setting. The thesis aims to enhance the students’ skills and abilities in nursing by strengthening the skills needed for basic pharmacology keeping in accordance with the project’s goals of enhancing nursing students’ skills and abilities. This project will benefit the nursing students at Laurea UAS as well as Laurea the institution itself.

The thesis project was a part of a newly implemented project in Laurea UAS and was conducted as part of a larger project, Facilitating Learning of Pharmacology and Medication in Degree Program in Nursing, with the aim of facilitating learning of pharmacology and medica-
tion in nursing degree programs. It was in accordance with the curriculum for the nursing degree program in English at Laurea University of Applied Sciences. The course Fundamentals of Pharmacology is a part of the study unit MEDICAL ASSESSMENT AND THERAPEUTIC METHODS which is five credit units in the nursing degree program in English. The course, Fundamentals of Pharmacology, counts for two out of those five credit units (Laurea UAS, soleops). The purpose of this study unit is to apply medical assessment and therapeutic methods in nursing. The course Fundamentals of Pharmacology aims to answer the questions: “What are the fundamentals of pharmacology?” and “How do related sciences support medical assessment and therapeutic methods in nursing?” The student will be able to, upon taking the study unit MEDICAL ASSESSMENT AND THERAPEUTIC METHODS, integrate knowledge of anatomy and physiology, clinical physiology, internal medicine, and pharmacology into nursing; apply his or her knowledge of gerontology and different diseases in nursing; identify information acquired by medical examinations and therapeutic methods in nursing; and provide safe pharmacology (Laurea UAS, soleops).

The purpose of the main project was to facilitate students’ professional learning in pharmacology and medication. The thesis was in accordance with the main project by having the same goals and aims: facilitating learning in pharmacology. The thesis also kept in union with the main project’s goals by aiming to enhance nursing students’ abilities and skills in nursing. The aim of the main project was to develop curriculum implementation of pharmacology and medication studies in the nursing degree program. The thesis project also aimed to enhance and develop the students’ skills and abilities in nursing.

As previously stated, this study is for the benefit of pre-registered nursing students and for the possible development of the curriculum in the nursing degree program in English at Laurea UAS. The method needs constant observation, evaluation, and development to which this thesis will contribute in part by providing information about the students’ experiences of how their learning was facilitated as well as their knowledge development throughout the implementation of the study.

This thesis aims to answer the questions: “What are the different ways a student may facilitate his or her own learning in pharmacology?”; “How is the lecturer’s background relevant in teaching a pharmacology class to nursing students?” and “What types of learning sessions will provide the best option for the facilitation of learning in pharmacology?” In regards to answering these questions, the issue of inadequate pharmacology knowledge of pre-registration students will be addressed.
4.2 Participants

The participants of this study consisted of the first year English nursing degree students at Laurea UAS (SNG10SN). The students had completed one full semester of anatomy and physiology as well as had some clinical experiences. The background of the students were varied with some students having a background in natural or social sciences and other students not having any exposure to health sciences at all. Studies have shown that it is more auspicious to teach pharmacology classes in the second year before clinical rotations (Manias & Bullock, 2002). Laurea University of Applies Sciences adopts a different approach to the nursing education program by utilizing the Learning by Developing model. Laurea University of Applied Sciences places heavy emphases of side-by-side theoretical and practical learning for students. In this manner, first year students will have one clinical rotation at the end of their first year. Because of this fact, it could behoove first year nursing students to partake in fundamentals of pharmacology classes during the first year before the clinical rotation.

It was decided with the academic advisers, Ulla Parviainen and Anna-Liisa Pirnes, as well as the dean of students that the SNG10 students would be the recipients of the fundamentals of pharmacology lectures thereby being the participants by default. No information was revealed beforehand of the students’ backgrounds in the health sciences, but after the first lecture, the students were very open about their previous knowledge, or lack thereof, of natural, social and/or health sciences. Prior research has been carried out by Shane Bullock and Elizabeth Manias in 2002, on two separate occasions, as well as Sally Morrison-Griffiths, Michael Snowden and Munir Pirmohamed also in 2002 which described nurses’ experiences in pharmacology lectures and those research experiments have become the primary theoretical framework for this study.

The SNG10 degree group was informed of the thesis project during the first lecture and their consent to proceed was obtained. It was explained that I would be facilitating pharmacology lectures, just like any other lecture carried out in Laurea UAS, and their active participation was not only expected but also appreciated. It was also clarified that there would be quizzes, exams and also student evaluations which would be collected and serve as data for the thesis project.

4.3 Planning the learning sessions

The contents of the learning sessions were in line with the Laurea UAS curriculum 2010 under the study unit, Medical Assessment and Therapeutic Methods. The specific area of focus was the course Fundamentals of Pharmacology. There were different sources of literature, for
instance textbooks, as well as my own experience with pharmacology and two years of nursing education to fuse together pharmacology lectures which are useful for nurses. The content of the learning sessions took place over two semesters, the spring 2011 term of the 2010-2011 academic year and the autumn 2011 term of the 2011-2012 academic year. The spring 2011 term was divided into four, one-and-a-half hour sessions during the month of May and the autumn 2011 term was divided into five, one-and-a-half hour sessions during the months of August and September. At the end of each semester, the students were handed evaluative forms to fill out and I, the facilitator, wrote my self-evaluation at the same time. At the end of the autumn term, a comprehensive, group exam was given to the students to evaluate their knowledge of both semesters’ learning sessions.

The method of carrying out the learning sessions was constructive. Use of the computer, writing board, handouts and active discussion were all used for better illustration of the concepts in each learning session. Besides the material, the students’ previous knowledge of anatomy and physiology as well as their, albeit limited, clinical experience coupled with a student-centered learning style and environment also aided in facilitating learning. Interaction and group work promoted learning and also eased the stress of learning from a single source of information, which may limit students’ abilities.

The use of questions in an interactive dialogue created an environment where the students’ opinions were respected and mutual trust and respect abounded. The students were guided to understand the nature of pharmacology and most importantly, how it is related and needed in nursing. The importance of asking questions, as well as asserting themselves in the learning sessions as well as the clinical rotations was highlighted. Problem-based learning was also utilized through the use of case studies during clinical pharmacology lessons. This caused the students to collaborate with their fellow classmates and negotiate between possible outcomes. Using problem-based learning allowed the student the opportunity to develop their skills in reasoning, self-directed learning and building a solid knowledge base. The students were responsible for their own learning and took collaborative responsibility for their group’s progress which is characteristic of knowledge building.

Assessment was based on the concepts of cooperative learning, with each other as well as with the facilitator. Case studies allowed the students to interact with each other and active discussions allowed the students to interact with the facilitator. This also aided in the development of critical thinking skills and knowledge in the fundamentals of pharmacology and how it is needed in nursing interventions. The questions in the case studies and discussions were broad, so there was no requirement of a correct answer. The main goal was to emphasize the importance of knowing where to find the answers, either through a colleague or written information, as opposed to having the right answer offhand.
4.4 Planning the implementation

Nine learning sessions, over the course of two semesters were carried out with the SNG10SN English nursing degree students. During these learning sessions, I intended to make them a reality by considering the various concepts of the thesis work which is facilitating learning in fundamentals of pharmacology for pre-registered nursing education. A plethora of teaching styles were intended to be given such as PowerPoint presentations, seminar style lectures, active discussions, group work, problem-based learning by case studies and tutorial sessions to improve learning experiences and allow the students to facilitate their own learning.

During the spring 2011 session, the four lectures were intended to discuss the following topics: orientation to fundamentals of pharmacology, Pharmacological concepts, and some concepts of clinical pharmacology.

The first lesson consisted of the orientation to fundamentals of pharmacology. During this lecture, the facilitator introduced the project and the thesis to the participants. It was explained that active participation is much appreciated and evaluation of the lectures as well as the lecturer will be gathered at the end of the spring and autumn sessions. A PowerPoint presentation was given which explained “What is Pharmacology” “Why it is important for nurses to study Pharmacology” and “what is the nurse’s role in medication and pharmacology”. The aim of this session was to establish fundamentals of pharmacology and to prepare the participants for learning clinical pharmacology.

The second lesson was comprised of information pertaining to pharmacological concepts. This lesson was planned to be an active discussion between the participants as well as the lecturer. Studies have shown that methods other than lectures help students to retain information better (Morrison-Griffiths et al, 2002). A handout of definitions was given to the participants among which will contain the definitions of: pharmacodynamics, pharmacokinetics, half-life, absorption, distribution, mechanism of action, agonists and antagonists, inhibitors and inductors among other concepts. The facilitator intended to ask the participants what they think the definition of the particular concept is and ask why he or she thinks it is important for a nurse to know and understand this concept. After an active discussion, the facilitator planned to inform the class that these concepts need to become a part of their vernacular.

The third lesson began to make the liaison between fundamentals of pharmacology and clinical pharmacology. The concepts covered included therapeutic drug monitoring, drugs and the elderly, drugs and the pregnant and breastfeeding, drugs and the renal patient, and drugs and the hepatic patient. The aim of this lecture was to make a firm link between pharmacolog-
cal concepts and clinical pharmacology. The use of case-learning and active role playing will play a role in solidifying these concepts into the participants’ education and thereby make it easier to recall them during clinical rotations and later on in their field of work.

The fourth and final lesson for the spring 2011 term intended to take one step into clinical pharmacology. The topic covered was the drug treatment of cardiovascular diseases. It is important for the nurse to know about the circulatory system as it is the central of all systems, and the start and end of most somatic illnesses (Downie et al 2008, 128). During this lesson, a PowerPoint presentation was to be given about the different drug classifications for cardiovascular diseases, the mechanisms of actions, the therapeutic effects, metabolism, excretion and drug interactions were all to be covered in this class. A case study was also to be given to reinforce the information given as well as aid in nurse medication guidance of clients. At the end of the lesson, an evaluative form was to be given for the participants to evaluate the first half of the pharmacology course and give constructive criticism for the lecturer. It was also stressed to the participants that the lessons will continue after the summer break and a quiz will be given at the beginning of the autumn 2011 session of lessons. The evaluation paper given will serve as the data gathered for the research to analyze qualitatively and input as results achieved for the thesis.

The autumn 2011 session was to consist primarily of clinical pharmacology. Drug treatment of respiratory disorders, drug treatment of gastrointestinal disorders, drugs acting on the central nervous system, drug treatment of infections and antibiotics, drug treatment of endocrine disorders, and safe administration including drug allergies, drug interactions, etc were to be covered during this session.

The first lesson of the autumn 2011 was to begin with a short individual quiz to test the retention of the information given during the spring 2011 session. After the quiz, which intended to be graded in class by the students themselves, thereby reviewing the last semester’s materials, the lesson would move forward in clinical pharmacology with the treatment of respiratory diseases. The participants were expected to know and understand how and why the circulatory system plays a role in the respiratory system and apply this knowledge into the treatment of respiratory diseases. Drug classifications, mechanism of action, therapeutic effects, metabolism, excretion, and drug interactions were to be covered in this lesson. Case-studies were also to be given to aid the participants in drug guidance for clients as well as reinforcing the information taught in the lecture.

The second lesson was to contain the lecturing of drug treatment of gastrointestinal disorders. A seminar style lecture would ensure that both the participants as well as the lecturer were active. Participants were expected to know the anatomy of the gastrointestinal system and
actively discuss how drugs would be beneficial. Drug classifications, mechanism of action, therapeutic effects, metabolism, excretion, and drug interactions were also to be covered in this lesson. Case studies were also to be given to aid the participants in drug guidance for clients as well as reinforcing the information taught in the lesson.

The third lesson was to include drugs acting on the central nervous system. This lecture intended to be taught in the traditional lecture style as there is a lot of information to be learned. The participants will also receive in the future, supplementary psychiatry lessons which will also have psychiatric pharmacology; so, not too much information was to be divulged during this lecture. Drug classifications and mechanisms of action were to be taught as well as therapeutic effects and some drug interactions. The participants were informed of their later studies in psychiatry; so, no case studies were shown. During this lesson, an antibiotic chart was to be given to the participants for them to study for the next class.

The fourth lesson was to be comprised of the drug treatment of infections and antibiotics. A group presentation was to be explained and each group was to be assigned a specific drug group to research and present to the class. As antibiotics are a very important part of the nurse’s guidance to clients, I took into account all of the necessary information the participants needed to include, especially information pertaining to the antibiotic chart. At the end of the lecture, short five minute presentations were to be given by the participants.

The fifth and final lesson for the term was to embrace the concept of drugs acting on the endocrine system as well as the safe administration of medication. Drugs and the elderly, drugs and the hepatic patient, drugs and the renal patient as well as effective communication were to be discussed. An open style discussion intended to be the method used for this lesson as the participants now have knowledge in fundamentals of pharmacology and basic clinical pharmacology. They were expected to know and understand how renal diseases affect on the excretion of medication, how hepatic diseases affect on the metabolism of medication, and how the aging process affects to both excretion and metabolism. They were required to use their previous knowledge about half-life, pharmacodynamics and pharmacokinetics to actively participate in the discussion. At the end of the lesson, the lecturer was to discuss the terms of the exam and explain what the students should know for the exam.

The exam utilized the concept of a group exam. It was a closed-book exam, but the participants were to be allowed to get into groups of 3-4 persons, to be chosen ahead of time by me and discuss what they have learned in the classes. The purpose of the group exam was to teach the participants that they do not have to have all the answers to the questions, but it is wise to seek the knowledge of the doctor, pharmacist, or fellow nurses in obtaining the an-
swer. As long as a nurse knows where to get the information, he or she can be held accountable for his or her answers (Bullock & Manias, 2002).

4.5 Planning the evaluation

Evaluative feedback forms were to be aimed at collecting data for analysis during the thesis process as well as improving the facilitation of future learning sessions. Due to the larger number of students, the evaluation intended to use open-ended questionnaires, in an honest and transparent manner. The evaluation forms were to be intended to be the same forms used in both semesters. The evaluation should be used for the students and the facilitator. In the facilitator’s case, it would be self-evaluation.

Monitoring action is essential in an action research project. As such the evaluation is needed to gauge and re-plan further action required in future research (McNiff et al 1996, 82). It is necessary for the facilitator to monitor her own actions as well as to inform the participants to monitor their actions. In this way, evaluation may be clear and concise and easier for me to interpret.

Critical conversations may be a good tool used in generating evaluative data. McNiff et al (1996, 63) state that critical conversations should take place at all stages of the research and criticism of the interpretations should be invited at all times. Questionnaires, observations, as well as the final grades obtained in the class work as well as the final exam can all means of evaluative data. For the purpose of this study, only the questionnaires would be used as raw data.

McNiff et al (1996, 79) also state that the use of a questionnaire and surveys are useful in obtaining information about the implementation of a particular project when other means of obtaining the information are not appropriate or obtainable. The use of a questionnaire is seen as the best possible form of obtaining evaluative feedback from the participants in the thesis project. An open-ended questionnaire will allow the participants free range in expressing themselves as well as preventing the facilitator from influencing any answers from the questions. Questions were intended to be asked about the style of the lessons such as the different teaching methods used (discussions, case-studies, group work, etc), the material covered in class, whether or not the participants felt they’ve retained information to be used later on in clinical rotations, and of course any constructive feedback will be most welcome from the participants.
Monitoring the facilitators own actions is essential in evaluating the thesis project. McNiff et al (1996, 56) state “the aspect of action research has very strong self-study elements”. This means that the facilitator, myself, also needs to evaluate my own actions keeping in mind ethics and trustworthiness. A self-reflective journal was planned to be kept during the duration of the thesis project. In this journal, I will evaluate my own actions, give constructive feedback, and state in which ways judgments may or may not have been compromised or influenced. At the end of the spring 2011 session, I planned to write a comprehensive entry into the journal about the entire session, stating the flaws, the strengths, and my thoughts about the participants’ actions during the session. The action was to be repeated again at the end of the autumn 2011 session. Keeping a diary in an action research project will serve four purposes: 1) keeping a time-line, 2) illustrate different points about the project, 3) used as raw data and may be analyzed to obtain findings, and also to 4) chart the progress of the research project (McNiff et al 1996, 58-59). In addition to student and self-evaluation methods, exams were intended to be used in data collecting.

5 Conducting the study

The implementation of the study was intended to be carried out in the manner which was described in the planning of the study. However, this study was not completely able to be implemented as planned due to unforeseen circumstances. Approximately eighty percent of the plans were carried out to completion.

5.1 Spring 2011 term

As previously mentioned, the spring 2011 term was divided into four, one-and-a-half hour learning sessions. Each learning session was to contain different styles of teaching and facilitating methods as well as to cater to the needs of the students in developing their own learning and knowledge in fundamentals of pharmacology. The different concepts covered included orientation to fundamentals of pharmacology, Pharmacological concepts, and some concepts of clinical pharmacology.

The first lesson was to establish a foundation in fundamentals of pharmacology and served as an orientation lesson. I made clear the intentions of the course as well as the expectations of the students not only related to the course but to the thesis project as well. The objectives of the lesson were that, by the end of the session, the students would be able to understand and explain what pharmacology is, why it is important for nurses to study pharmacology and
what the nurse’s role is in pharmacology. I obtained the students’ consent to use them as participants, and overall the first lesson went according as planned.

The lesson was prepared with a PowerPoint presentation and a computer and projector was used. Open ended questions such as “why do you think medicine is important in nursing” or give some of your experiences with medicine either in life or on the ward” were used to encourage dialogue and interaction as well as to rid the students of any nervousness towards the classes or the facilitator.

The second lecture was aimed at teaching the students pharmacology terminology. Allowing the students to think for themselves, I asked them what they guessed, for example, pharmacokinetics meant just by dissecting the word itself: pharma = medicine and kinetics = movement; therefore, pharmacokinetics means the movement of medicine in the body. Other terms, such as duration or onset, which are not specific to medication or pharmacology, also allowed the students to discuss about the basic meaning of those words and how they are applied in medicine, specifically medication administration. Some terms relied on previous knowledge of health or natural sciences such as half-life or metabolism and the students either relied on their previous anatomy and physiology knowledge or were very honest in saying they did not know what those particular terms meant.

This learning session was also prepared with a PowerPoint presentation and a computer with a projector was used. Active discussion was utilized and the students were very vigorous in giving their opinions on what certain terms meant and even going so far as to give their reasons as to why knowing these terms are important in nursing.

The third lecture attempted to make the connection between fundamentals of pharmacology and clinical pharmacology. The students were expected to use the terms learned in the previous session and incorporate that vernacular into any answers they provided to questions asked by the facilitator. The students were also expected to draw upon their previous knowledge of nursing interventions to give explanations how and why knowing about renal or hepatic diseases are crucial to the administration of medication and guidance to the patient. This learning session, unfortunately did not go one hundred percent according to how it was planned and parts of the lecture had to be left out for the sake of time. The topic, drugs and their effects on the renal patient, was not covered during this lecture.

The final lecture of the semester intended to take the first step into clinical pharmacology. The goal for this lecture was that by the end of the session, the students would have an understanding of the pharmacological treatment of cardiovascular diseases. A traditional lecture style session took place with a PowerPoint presentation. Active discussion was still an
integral part of the lecture and open ended questions which allowed the students to reflect on their nursing intervention and recall the different types of cardiovascular complications as well as their thoughts as to how certain medications could alleviate those symptoms. The students were also expected to remember the vocabulary from the second session and recall what metabolism, excretion, therapeutic effect, and other concepts of pharmacokinetics, -kinetics, and -therapeutics. The case study went according to planned, and the students were able to take the knowledge they just learned and apply it to a clinical setting. Although time was tight, there was enough time for students to voice their questions, and misunderstandings about any aspect of the lecture or previous lectures. Finally, at the end of the session, the students were handed evaluation forms, and the students were encouraged to use complete sentences and answer the questions to the best of their abilities.

Overall, the first semester of learning sessions went about eighty-five percent according to plan. There were some unforeseen circumstances and not all the material was able to be implemented, but trial and error is a large part of any action based research project (McNiff et al 1996, 12)

5.2 Autumn 2011 term

The autumn 2011 term took place over five, one-and-a-half hour sessions during the months of August and September. Each learning session was designed and implemented with the intention of creating variety in the facilitation styles and to encourage the students to take responsibility for their learning. During this term, more emphasis on clinical pharmacology was placed and the concepts covered included the drug treatment of respiratory, gastrointestinal and endocrine disorders, as well as treatment of infections, drugs acting on the central nervous system and the safe administration of drugs. At the end of the term, an all comprehensive, group exam was implemented to test the retained knowledge of the students from both semesters.

The first lesson continued with clinical pharmacology and discussed the drug treatment of respiratory disorders. It was explained to the students their requirements to incorporate their previous knowledge of anatomy and physiology as well as their knowledge of circulatory medications with the new knowledge of respiratory medications. In the first twenty minutes of the session, a short quiz was given to the students to test their retention of knowledge from the previous semester’s classes. The quiz evaluated the students’ knowledge of pharmacological concepts, medicine administration, as well as some clinical pharmacology. Due to time constraints, the quizzes were not able to be graded in class as planned; instead the facilitator quickly went through the answers and took the quizzes to be graded at a later time.
A PowerPoint presentation using the computer and the projector allowed the students to use their critical thinking skills. Active discussions between the students and the facilitator gave way for the students to reflect on previous lectures in pharmacology, anatomy and physiology and nursing interventions and make the knowledge obtained in those lectures a reality in this lecture. Again, due to time constraints, parts of the lecture had to be left out. In this instance, the case study was left out for the sake of finishing the lecture in the time allotted.

The second lecture was not implemented according to plan. Instead of the seminar style session as originally designed, the traditional lecture style with a PowerPoint presentation and projector was employed. The concepts covered in this session included the drug treatment of gastrointestinal disorders relating to the different drug classifications and their respective mechanisms of action and indications for use. At the end of the lecture, a case study was explained to the students and it was their responsibility to use the information they learned and apply it to an everyday nursing setting. The students were very active in contributing ideas to the questions involved in the case study and even gave ideas and suggestions that I, the facilitator had not considered.

The third learning session was implemented as planned and the students were well informed of their future psychiatry courses which would explain more pharmacology of psychotropic drugs. The lesson also made use of PowerPoint and the traditional lecture style. Concepts covered during the lecture included different classifications of psychotropic drugs such as anti-depressants and anxiolytics, their respective mechanisms of action and briefly their indications of use. Time management was used well and the antibiotics chart was given to the students at the end of the class as projected. The students were very active in discussion as well as asking questions about certain drug classes and even gave some of their own experiences with psychotropic drugs whether in their personal lives or in the clinical field.

The fourth lecture also stayed true to the implementation plan. The students were divided into four groups with each group given a certain drug class to research and present to the class: antiviral drugs, antimycotics or antifungals, antihistamines, and cyclosporine with protease inhibitors. The groups were given the responsibility of giving drug names in each classification, their mechanisms of action, their indications of use, and any notable side-effects or interactions. The students were allowed one hour to gather and organize the information needed with the last twenty minutes for presentations. Each group had five minutes to present their information to the rest of the students. At the end of the lecture, I went through the antibiotic chart, naming the most commonly used antibiotics and explained to the students the need to understand this chart including the name of the antibiotic, the class it
comes from and some of the indications of use. I also promised the students to give them a handout of the information pertaining to antimicrobial drugs for them to study for the exam.

The fifth and final lecture of the course was implemented as planned. Concepts covered were drugs acting on the endocrine system as well as safe medication administration for nurses. Open and active discussion occurred between the facilitator and the students as well as between the students and themselves. A PowerPoint presentation was applied to enforce ideas about safe pharmacotherapy as indicated by the Ministry of Social and Health Affairs in Finland as well as reinforcements of monitoring patients with renal and/or hepatic deficiencies. The use of open-ended questions, posed by the facilitator to the students allowed each student the opportunity to state his or her ideas and experiences as well as reflect on previous lectures and apply previous knowledge to the current lecture. At the end of the lesson, I allowed the students to pose any questions about the upcoming exam as well as stated my own expectations for the exam. I also explained to the student the structure of the exam and different terminology I would use, for example, when asked “what is the pharmacology of a certain drug” I expected the student to explain everything about that drug in reference to pharmacokinetics (absorption, distribution, metabolism, excretion), pharmacodynamics, and pharmacotherapeutics (notable side-effects and interactions as well as indications of use).

The exam itself was conducted a week and a half after the last lecture. The class was divided into three groups, which was predetermined by the facilitator, and the expectations and rules of the exam were stated again at the beginning for clarification. The students were allowed to consult with each other in the group, but were not allowed to bring in any outside material or notes from the lectures. The questions were structured with some definitions of concepts, some explanations of the nurse’s role in medication and pharmacology, explanation of certain medications, a section of the antibiotics chart which the students had to fill, and lastly a case study similar to the ones discussed during the lectures. After the exam, the students were handed again an evaluative form for them to fill out. The students were explained the emphasis of writing and using complete sentences to answer the questions and to try and write anything that came to mind regarding the questions for the sake of the project.

Overall, the second semester of classes might have deviated from the plan more than the first semester, but one cannot plan for unforeseen circumstances. Research is always evolving, and it is quite rare that something is implemented one hundred percent according to planned (McNiff et al 1996, 12).

5.3 Data collection
The data collection stage of the project is the equivalent of implementing the evaluation. The evaluation of the implementation was carried out by the students as well as me, the facilitator, by answering questionnaires. At the end of each term, the students were requested to fill an evaluative form and the facilitator also filled out a similar form. The method of collecting data for this project is heavily dependent on the research questions posed and the type of information needed to answer each question. In this scenario, the research question and information needed dictated that an open-ended questionnaire as well as evaluating exams would be the method of collecting data (Elo & Kyngäs, 2007). Statements regarding the facilitator’s competence were employed to improve the second set of lectures in the autumn term.

Open-ended questions stimulate the participants to write using complete sentences. Questionnaires are also more useful when collecting data from a larger audience (McNiff et al 1996, 32). Participants were guided to answer a set number of open-ended questions while given liberal time and a quiet atmosphere to express their personal views based on their own concerns and experiences. The students were prompted to answer questions in relation to the learning sessions’ content, style of lecturing, competency of the facilitator, and environment of the lectures. The questionnaire allows for the research questions of the thesis project to be answered by guiding the students to give feedback without a wide deviation (Silverman 2004, 42).

Self-evaluation was another method to collecting data. At the same time the participants were writing their evaluations, I wrote mine and answered questions also related to the content of the learning sessions, the style of lecturing, my own strengths and needs for development, and the sessions’ environment. McNiff et al (1996, 12) state “the aspect of action research has strong self-study elements.” This means that I, as the person conducting the research, need to evaluate my own methods and actions, making myself accountable for my decisions, and keep in mind all aspects of ethics and trustworthiness.

5.4 Data analysis

The data in this study refers to the answers to the evaluation forms. The data analysis stage of this project is also related to implementing the evaluation, but in this case was carried out by myself as the facilitator by inductive content analysis. There are many different ways of analyzing data; however, the goal of data analysis is to transform raw data into something meaningful (Silverman, 2004, 53). In this case, raw data in the form of evaluation forms will be transformed into more meaningful patterns which will answer the research questions related to this project. Qualitative research is a study which aims to answer “why” and “how”
of a phenomenon thereby investigating answers to a particular trend of behavior (McNiff et al 1996, 37).

Inductive data analysis is defined as a systematic method of analyzing data qualitatively where the researcher theorizes and internalizes data to form categories and/or themes (Ezzy 2002, 11). Qualitative inductive analysis enables a researcher, in this case, myself as the facilitator, to analyze and gather meaning from the data collected from the participants, or the learners. It helps to discover patterns, themes and categories and to organize and describe what occurred during the implementation. According to Silverman (2004, 182), A piece of data, being either a word, a group of words, or a sentence, has a label attached to it called a code, or index, or note. A theme is a label that summarizes the essence of a number of related codes. A category is then a group of related themes. Silverman (2004, 185) also recommends using mind maps or concept maps to aid in the data sorting process. Mind or concept maps make it much easier to see the entire scope of the results as well as each part at the same time. After the content has been analyzed, using inductive analysis methods, the researcher familiarizes herself with the data to understand the content. The researcher then marks the simplified expressions from the data and gathers them together. As the researcher collects the simplified expressions, she then simplifies them and puts the simplified expressions in a list. The similar and overlapping expressions are then removed and the remaining data is divided into groups. Finally groups and categories are formed (Ezzy 2002, 80).

For this study, elements from Silverman’s (2004), McNiff et al (1996) and Ezzy’s (2002) methods were used. The data collected for this study included evaluative feedback forms from both semesters of learning sessions. Data was gathered and then reviewed by me to become more familiar with it. I used mind maps and other creative methods for internalizing the data. For the purpose of this study, the verbiage of the students will be considered as data for analyzing.

All of the evaluative forms were read through again and the information and expressions that were decided to be valuable to the study were marked and collected into a separate file on the computer. This gave rise to a set of categories and allowed for a more detailed comparison of the data. The subcategories were reviewed conceptually as well as empirically, keeping in mind the research questions. The subjective distinctions drawn out by the data by the learners’ experiences were noted as well as other suggestive ideas. In some instances subcategories were discovered. Experiences of the students which fall outside of the research area were also taken into consideration. In addition, my own experiences are a useful tool to help improve the breadth and depth of the analysis and findings.
All of the data was written by students onto the evaluative feedback forms and exams. The words and phrases valuable to the study were then underlined and added to an Excel spreadsheet. After collecting the simplified expressions into one document, sub-categories were created from the simplified expressions, according to what were the most commonly expressed issues from the students.

According to what was viewed as valuable to the study, nine sub-categories were discovered of which all were decided to be kept: “Motivation and involvement of the students”, “Presentation skills and knowledge of pharmacology”, “Attitude towards learners”, Interaction between facilitator and students”, Calm, fun and stimulating learning environment”, “Coherent content related to learning objectives”, “Timing of lectures”, “Informative learning materials”, and “Relevant and practical learning materials”. These nine sub-categories were deemed to fit into four categories: “Competence and ability of the facilitator”, “Supportive learning environment”, “Content consistency and timing of lectures”, and “Consistency of learning materials”. These four categories then belong to the main category of “Facilitating learning of pre-registered nursing students in fundamentals of pharmacology”, as is the topic of the thesis. Figure 3 best illustrates these categories.
Findings

As previously mentioned, the findings from the students’ evaluations produced four major categories: “Competence and ability of the facilitator”, “Supportive learning environment”, “Content consistency and timing of lectures” and “Consistency of learning materials”. These four categories will be discussed in detail in this section.

6.1 Competence and ability of the facilitator

This category was derived from three different sub-categories after analyzing and interpreting the raw data provided by the informants who were the SNG10SN students at Laurea UAS. Students observed that the facilitator influenced their learning in numerous ways such as her
personality and previous knowledge of pharmacology. The sub-categories that constituted this major category included: “Motivation and involvement of students”, “Presentation skills and knowledge of pharmacology” and “Attitude towards learners”. The students stated that the facilitator showed wide and vast knowledge of the subject and was very well prepared for each lesson. The students demonstrated this by answering the questions in complete and coherent sentences.

“The lecturer is of very good knowledge and teaches very well”

“Corinthia is a very well organized lecturer and has made the lesson a very appreciated and fun class and we still get important information to our knowledge”

“Corinthia’s knowledge of pharmacology contributed to a good amount of content, not too much neither too far from what nurses should know”

“It’s great that Corinthia knows about pharmacology and about nursing studies so we don’t have too much, nor too little information to learn”

According to the students, to enhance their learning, it’s imperative for the facilitator to motivate the students and get them involved in the teaching. Asking open-ended questions during the lectures and/or asking ‘why’ questions when a student answers a previous question, allows for the students to be motivated and interested in the class.

“The repetition you gave was fantastic, is always asking for involvement from the class allows us to use our own brains & try to recall what was just learned which obviously makes it stick longer.”

“Corinthia asked many questions & we had repetition & quiz which motivated me in studying”

In addition to the presentation skills, knowledge of the course and motivating and involving the students in the lectures, the facilitator’s attitude towards the students contributed to their learning. This was demonstrated mostly by the students’ comments about the facilitator’s personality and interest in the subject.

“The lecturer was very happy, open and enthusiastic and these qualities transferred to the class.”
“You are a lively and animated teacher, you can make any subject enjoyable! You are my hero!”

6.2 Supportive learning environment

This category resulted from the two subcategories: “interaction between students and the facilitator” and “calm, fun, stimulating learning environment”. The subcategory of “interaction between students and the facilitator” was a direct consequence from students’ statements about interactive dialogue and the degree of engaging lectures as well as group interaction amongst the students themselves.

“The lectures were engaging because the pace was good and the lessons were interactive.”

“Lectures were interactive, not just the teacher presenting & talking. You motivated us by asking questions & our opinions.”

Students understood the value of having a lecturer that knew the boundary between a facilitator and a student, but at the same time invited a fun and relaxing teaching style. Having a connection with the students allowed for them to participate actively in lectures and improve interaction. In addition, group work, according to the students, really enhances their learning and allows them to discuss with each other the objectives set in the classes.

“Your teaching style is both fun and relax - at the same time firm and strict 😊”

“I felt some kind of a connection like one-to-one level”

“Yes the lectures were engaging and the teacher really understood the students. She was very fair”

“A group exam was a great idea. Suggestion: have students do few group exams during courses wither they can use their notes. These exams would not be evaluated, but they’d enhance learning.”

“Your style of teaching was good, but you should introduce more group work and more case studies so that students can learn to indentify diseases and drug names.”
A supportive learning environment, according to the data received, also involves a calm, fun and stimulating learning environment. This makes an already familiar learning environment comfortable and relaxed and aids in facilitating learning, as demonstrated by the students’ comments.

“Yes, I did [participate]. The atmosphere at the class was easy-going and friendly, which made participation easy as well”

“It is a funny, friendly atmosphere which leads to an open learning environment.”

“Lessons were great and the atmosphere was enthusiastic. It was a pleasure walking into your class 😊”

“The style was very nice, familiar and relaxed which was great”

6.3 Consistency of content & timing of lectures

Two subcategories, “coherent content related to learning objectives” and “timing of lectures” comprised this main category. Overall, students’ learning is enhanced when the content of the lectures coincide with the learning objectives stated at the beginning of the course as well as the beginning of the lecture. Timing of the lectures, whether each individual lecture or the entire layout of the course, also contribute to motivation and the facilitation of learning.

The subcategory “coherent content related to learning objectives” came about from the students’ comments about the nature of the content of the lectures. Statements from the students illustrated that the content had theoretical elements which further contributed to their learning of fundamentals of pharmacology.

“[The content] increased my knowledge of drugs and how they work. Also I’m able to understand much better the drugs used in wards for elderly and what kind of meds I’ve used myself.”

“There was a lot of detail in the content, which is good. I believe all the knowledge will support me with my future knowledge”
Students also stated that the use of earlier knowledge in relation to fundamentals of pharmacology helped them to bridge the gap between theory and practice. Using previous knowledge from prior courses helped them to understand why medications work in certain ways. Moreover, having one clinical rotation done, students were able to draw upon their experiences and relate them to learning pharmacology.

“It [the content] made me understand many of the medications used at my first placement, and also prepared me for the placements ahead next fall. Also added a lot of useful knowledge to my future specialization”

“Anatomy was really important. It helps to know the anatomy because it helps the understanding of how the medicine work. Also work placements gives us the idea of how the medicine is used and why.”

The second subcategory “timing of the lectures” derived from students’ comments about the scheduling of the lectures. This included the timing of the individual lectures and my choice to have more 1.5-hour lectures as opposed to fewer 3-hour lectures as well as the timing of the entire course. Overall, students gave positive feedback about the length of the individual lectures.

“The time was short, but used well. I learned much and now have the resources (options) to learn more (book suggestions, slides, notes, medicine names).”

“I’m glad that we had shorter amounts of time instead of a full three hours. It was easier to concentrate.”

“It was a lot of information for sure but taking shorter sessions helped to digest and internalize the info given.”

It was decided that the course would take place over two semesters and would be a total of twenty hours. Students felt that while having more, shorter lectures was more beneficial than fewer, longer lectures, having the summer break in the middle of the was not beneficial to their learning.

“The two semester was very good, how the summer break in between was a little bit inconvenient but it would be nice to have no interruptions”

“Overall the only problem was the summer break it should not have happened. It made things difficult”
“Would have probably helped to have the whole study unit together as a whole in one semester”

Furthermore, while students felt that having shorter lectures were beneficial in information retention, students felt that 1.5 hours were too short and did not leave enough time to get through all the material as intended. Principally, students would have preferred to have slightly longer learning sessions in order to ensure that all the material is taught with enough time for discussion and questions. Students also commented on the fact that in their opinions, there were not enough lectures and twenty hours for the entire course is not enough.

“For some of the classes time given was enough but for some it really wasn’t enough. With such an interesting topic it could’ve been good having more time”

“The time given contributed to the Learning through contact lesson, explanation, lectures, question-answer sessions, but it was too little for the material to be covered”

“It [the timing of the lectures] did contributed to my learning of fundamentals of pharmacology and I wish we had more lessons”

“I wish the school had reserved more class time for the course due to the amount of information presented. I felt the course went too fast.”

6.4 Consistency of learning materials

This major category consists of the subcategories “informative learning materials” and “relevant and practical learning materials”. First and foremost, students place high value in lectures with learning materials that are informative and relevant to the topic at hand. They gave positive feedback concerning how informative the information was in relation to their learning.

“The materials given were easy and well organized and understanding. Every piece of information was clear and gave me a motivation and interest in the study”

“Clear information was given that was understanding and vital”
“It [the material] helped me to gain a great over understanding of different drug groupings and what diseases are treated with which medicine”

Students also appreciated with the materials given and the lecture contained information which was relevant to them as nurses as well as relevant to the learning objectives. Learning can be facilitated when students do not have to sift through extraneous information in order to determine the value for learning that particular piece of knowledge.

“There was no ‘extra crap’ like we usually get with the other teachers. All the info was straight forward straight to the point and very clear. There was nothing 'turha' [extraneous]”

“Your PowerPoints are excellent, thank you for hand-outs, as it’s nice to be able to focus to the teaching!”

Also, using practical learning materials such as case-studies work to enhance the students’ learning. Students can reflect on the material learned in the lecture and apply that knowledge to a real life situation, thus, bridging the gap between theory and practice.

“Yes, it was engaging because of the fact that you provided case studies at the end of every topic and also because you gave review questions from the previous lessons”

“I believe Corinthia helped by having good explanations and case studies as well. They helped to solidify our understanding of the material by making them more concrete”

7 Discussion

The purpose of this thesis was to describe how learning can be facilitated amongst pre-registered nursing students in the course Fundamentals of Pharmacology. Enhancing nursing students’ skills and abilities by strengthening basic pharmacology knowledge was a secondary goal of the thesis project. This thesis constituted a newly implemented project at Laurea University of Applied Sciences (UAS) conducted as a part of a larger project with the aim of facilitating learning of fundamentals of pharmacology and medication in nursing degree programs.
The research questions intended to describe the different ways a student may facilitate his or her own learning in pharmacology; the relevance of the facilitator’s background in teaching a pharmacology class to nursing students and the different types of learning sessions that may provide the best option for facilitating learning in fundamentals of pharmacology. In addition, the issue of inadequate pharmacology knowledge of pre-registrations students was addressed.

The process involved in answering these questions included organizing and implementing twenty hours of contact lessons in a classroom setting over a period of nine, one-and-a-half hour lectures, divided amongst two semesters, plus a two hour all comprehensive group exam at the end of the course. The participants included the students in the nursing group SNG10SN and were on average 16 students per lecture. At the end of the spring term and the autumn term, evaluative feedback forms were collected from the students, which served as raw data which was then analyzed qualitatively using inductive content analysis methods. This led to the development of categories and subcategories discussed previously. Figure 4 shows how each major category overlaps with the next to create the facilitation of learning in fundamentals of pharmacology.

Figure 4: Interrelation of major categories

Of course there were challenges along the way. I being the facilitator as well as a fellow student created, in some aspects, confusion amongst the participants. This led to some students taking advantage of the fact that I was a fellow student and not attending some classes. Students knowing that my thesis work was dependent upon my teaching them in some ways may have compromised their judgment and it was difficult at times discerning the meaning behind their feedback, or whether or not they were being truthful or just helpful; however, the find-
ings showed that notwithstanding, all of the information pointed to how the students were able to learn and facilitate their own learning.

The findings demonstrated that new knowledge was obtained about how students facilitate their learning as well as effective learning in fundamentals of pharmacology. According to the results, students learn best when the facilitator is a fellow colleague, or nurse, as well as someone who is knowledgeable and enthusiastic about the subject being taught.

7.1 Ethics

Action research should be considered in all humanistic aspects, including and most especially ethics, as action research involves human subjects. The overall credibility and validity of any qualitative research is dependent upon the researcher following good scientific practices (Ezzy 2002, 73). The facilitation of learning of fundamentals of pharmacology required careful consideration of both teaching and nursing ethics from the preparation to the evaluation stage of the thesis project.

Auerbach and Silverstein (2003, 42) state that reliability and validity are important criteria for quantitative research because they assure the reader that the measuring scales are objective. With qualitative research a response may be valid and reliable using justification methods. Justifiability is a good alternative to reliability and validity. It is justifiable for the researcher to use her subjectivity in analyzing and interpreting data, but it is not justifiable for the researcher to impose her subjectivity in a way that is not grounded in the study (Auerbach & Silverstein 2003, 45).

Transparency and communicability are important aspects in ensuring the measurements may be justified. Other researchers need to know the steps the researcher has taken in the project and they must be communicated in as clear a way as possible to assure the reader of no misinterpretations (Auerbach & Silverstein 2003, 50). The focus of ethical considerations has different emphases and extents in different phases of the study, due to the nature of action research. According to Ezzy (2002, 72), ethics in research is a number of key issues which must be taken into consideration in order to protect the rights of the participants. These issues range in variety from informed consent, confidentiality and guaranteed anonymity, voluntary participation with the right to withdraw at any time, the role of the researcher, not distorting data and honesty.

Because this project is action based, I as the facilitator, followed all protocols of the action research process of planning, implementing and evaluating the study. The learning sessions
were planned in accordance with the curriculum at Laurea University of Applied Sciences. Evaluative feedback forms for judgment of the learning sessions were used to collect data for the purpose of describing the participants’ subjective views of the facilitation process. The raw data was then analyzed using inductive qualitative analysis methods. Evaluation was employed at the end of each term and used subsequently to improve and/or change the next implementation.

Informed consent is an ethical principle which requires researchers to obtain the voluntary participation of subjects after informing them about possible risks and benefits (O’Leary, 2004). Informed consent involves providing information about the ongoing project and the meaning of the participants. Students were explained that their participation is completely voluntary and they have the right to withdraw from the study at any time. The students were also informed of their right to dignity, confidentiality and anonymity.

A part of the research could be considered to be unreliable as written informed consent was not obtained from the students. At the first lecture, the details of the research project were fully explained and it was stressed to the students that their participation was completely voluntary and they had the right to withdraw from the study by not filling out the evaluation form at the end of the semester. It was also mentioned that their declination to participate did not in any way affect their final grade in the course fundamentals of pharmacology. Verbal agreements from the students were obtained and at the end of the semester, students were reminded of their voluntary participation and the fact they did not have to fill out the evaluation form if they did not wish to.

Consideration to nursing ethics was also given, especially nursing ethics concerning the safe administration of medication and the evidence based material to help present concrete information was reviewed. Material involving the nurse’s role in medicine and pharmacology was carefully considered when planning the implementation and again reviewed upon implementing the learning sessions. Content was decided upon based on previous, personal experience in the clinical rotations as well as previous pharmacology courses taken. It was decided by myself and approved by the academic advisers, Ulla Parviainen and Anna-Liisa Pirnes, that the content would include basic pharmacological concepts and some basic clinical pharmacology involving the major anatomical systems (respiratory, circulatory, gastrointestinal, neural, etc) as well as safe pharmacotherapy as deemed by the Finnish health ministry.

In order to reach the goals set by this project, upholding the professional expectations as a facilitator of learning was needed. To guide students in fundamentals of pharmacology from the point of view of a nurse, wide and vast knowledge of nursing interventions related to medicine administration as well as clinical pharmacology must be possessed by the facilitator.
Professional ethics creates a set of morals, not laws, deemed acceptable or unacceptable by society. These moral obligations encourage the level of cooperation with participants and other parties and promote the achievement of a set goal (Ezzy 2002, 74).

The professional ethics of a facilitator involve the objectivity of said facilitator in planning the lessons according to the curriculum as not to mislead the students. This process would continue throughout the implementation and evaluation stage as well. It is also beneficial to remember that the way a facilitator presents herself is directly related to influence of student learning. In this way, it is necessary to note that every action affects, in some way, the success of a learning session (Auerbach & Silverstein 2003, 63).

Prior to starting the project, permission was sought and obtained from Laurea UAS through the academic advisers who approved the thesis topic. Further permission was necessary and attained from the students by the academic advisers to have them as participants in the research project and was later confirmed by me at the start of the implementation.

Finally, another aspect of ethics in research is honesty and respect for intellectual property. This involves giving credit where credit is due and avoiding plagiarism. Throughout the duration of the publication process of the thesis project, full credit has been given to the authors whose work was the basis of the thesis.

7.2 Trustworthiness

Trustworthiness is an essential component to qualitative research. It is displayed by the findings reflecting the reality of the experience. According to Auerbach and Silverstein (2003, 60), trustworthiness should be assessed according to the purpose and circumstances related to the study. As mentioned with ethics, trustworthiness is heavily reliant upon reliability and validity.

When evaluating trustworthiness, the purpose of the study, the personal commitment of the researcher to the study, the data collection, the participants of the study, the relationship between the researcher and informants, the length of the study, the reliability, data analysis and finally reporting the analysis must all be evaluated (Auerbach & Silverstein, 2003, 58). It is, in other words, the responsibility of the researcher to ensure that the readers have enough information about the process of the study in order to evaluate the findings sufficiently.

This thesis has evaluated the trustworthiness by using the methods mentioned above; by also evaluating each aspect of the study and looking at the trustworthiness of the study as a whole.
Throughout the entire process of the project, evaluation has been present and is still an ongoing process to ensure the trustworthiness of the study as well as the facilitator. Objectivity is a necessity and it’s through remaining objective that any researcher, or facilitator of learning, including myself, increases her chances of success of the research project being reliable.

The purpose of this thesis was to describe how learning can be facilitated amongst pre-registered nursing students in fundamentals of pharmacology through planning, implementing and evaluating learning sessions at Laurea UAS. The subjective experiences of the SNG10SN students would thus be collected as raw data to be analyzed in order to answer the research questions: “What are the different ways a student may facilitate his or her own learning in pharmacology?”; How is the lecturer’s background relevant in teaching a pharmacology class to nursing students?”; and “Are the teaching strategies used in this project adequate enough for the student to be able to retain the information taught?” In addition to answering these questions, the issue of inadequate pharmacology studies has also been brought to attention. I believe the purpose has been reached and the research questions answered satisfactorily by choosing the participants, collecting data, analyzing said data and generally speaking throughout the entire report where focusing on the research has been the strong point and present in all aspects.

Trustworthiness in research may also be considered as the authenticity of a study. McNiff et al (1996, 124) illustrate that in order for a research study to be authentic, it must show the methods used throughout the study as well as correctly and truly report the views of the participants. Keeping this in mind, I made sure to create equality and fairness amongst the participants. Under no circumstance were the students to be subject to manipulation from me or their words manipulated to produce certain results. I made sure the students knew their grades in the pharmacology classes were completely objective based only on their participation in class, their quiz and exam scores, and eighty-percent attendance. Their willingness or not to participate in evaluating the course did not in any way influence their final grade in the course.

In every aspect of the study, from the literature search to the planning, to the implementing, to the evaluating, and finally the publication, trustworthiness was put into practice. This project kept in accordance with the curriculum of Laurea UAS and the literature search, based on the curriculum was conducted using credible sources. The content of the lessons were based off the material deemed necessary by Laurea UAS as well as current and relevant scientific knowledge. The planning of the implementation was done with the help and supervision of the academic advisers who served to guide me in ensuring the coherency of the content following a systematic and logical progression of basic to clinical pharmacology.
During the implementation stage, while the academic advisers were not present throughout every single learning session, there were sessions where supervision took place and at the end of the class, verbal constructive criticism was offered on strengths and weaknesses and how to improve the sessions. This in turn, contributed to the validity of the research by ensuring accurate information was provided to the student learners. The implementation consisted of nine learning sessions divided over two semesters. Materials used throughout the implementation consisted of PowerPoint presentations, handouts, created by me according to the information found in the books recommended by Laurea UAS. Information about safe pharmacotherapy was provided to the students via links in the presentations and handouts for the students to familiarize themselves with. The purpose of this information was to provide the students with Finland’s expectations of nurses where medication administration is concerned. Feedback from the first semester was used to improve the second semester. Students, again, were not forced into filling out the evaluation forms and at the end of the first semester, fifteen forms were collected, while only thirteen forms were collected at the end of the second semester.

McNiff et al (1996, 126) describe different validating methods to ensure ethics in a research project. Self validation shows to the researcher’s own satisfaction that the researcher has done what she set out to do. It is also important for the researcher to state where any mistakes or misinterpretations may have been had in the duration of the project to ensure the reader of the researcher’s trustworthiness. It is important for the researcher to state where any changes to the original plan had been made as well as ensure that evaluative measures were taken as objectively as possible, especially concerning the self evaluation. The researcher should not be influenced by the participants’ responses in any way while writing her own self-evaluation. This was carried out during the evaluation phase of the research. After each learning session, I wrote small notes about how the session went in order to better preserve the memory of the session when it comes time to write my self evaluation at the end of the semester. I wrote my evaluation at the same time as the students so I would not be influenced by their answers about how the implementation was conducted.

The duration of the study lasted all together about a year and a half. The suggestion of the project came from Anna-Liisa Pirnes and Ulla Parviainen during the autumn semester 2010, and the first implementation was conducted in the spring semester in 2011. The schedule has been compact and I’ve been able to manage my time well. Because of the intensive nature of the project, I’ve been able to keep all the material fresh in mind throughout the entire duration of the study. This also allowed for me to remain interested in the study.

Personal commitment, admittedly, was a struggle at first as I did not wish to do this study originally. With much support from the academic advisers, I soon realized that this study
would not only benefit Laurea UAS, but also me, by allowing me to teach my passion, medicine. I did receive monetary compensation from the University as it was decided by the academic advisers that twenty hours of contact lectures are more than enough to be able to write a Bachelor’s thesis and I deserved some monetary compensation for the other hours of work. Working by myself as opposed to working with a pair or group allowed me to be able to focus solely on the project itself and not worry about scheduling conflicts that normally arise out of working with other people; however, because I was working alone, and received payment for my work, it was necessary that I remain objective and numerous meetings with the academic advisers ensured that my objectivity remained intact. For example, I wanted to use every aspect of the course (evaluation forms, quizzes and exam) as raw data for the study. Ulla explained because this is a Bachelor’s level thesis and not a dissertation, it is not necessary to include all aspects of the course. She also stated that generalization and repeatability are not goals of this study, only to describe how learning can be facilitated. Because of this, I used the evaluation forms as the primary source of data with the exam as a secondary support source.

Overall, the trustworthiness of this study has been considered throughout all aspects of the study. Because this is a small-scale study, results that can be generalized or repeated is not a goal while describing experiences and providing suggestions for improvement is. The purpose of this study was to describe how learning can be facilitated amongst pre-registered nursing students in fundamentals of pharmacology; the data collected corresponds to the purpose and thus refers the study to have reliable information.

7.3 Conclusions and recommendations

The purpose and the aim of this thesis project were to describe how nursing students can facilitate their learning in fundamentals of pharmacology by planning, implementing and evaluating learning sessions. Keeping in accordance with the curriculum at Laurea University of the Sciences, this project was planned and implemented. This project was also in part of a larger project at Laurea UAS which was aimed at enhancing and empowering students’ professional skills and knowledge in pharmacology and medicine administration.

Three research questions were seeking to be answered: “What are the different ways a student may facilitate his or her own learning in pharmacology?”; How is the lecturer’s background relevant in teaching a pharmacology class to nursing students?”; and “Are the teaching strategies used in this project adequate enough for the student to be able to retain the information taught?” In order to answer these questions nine, 1 and a half hour learning sessions divided over two semesters were planned and implemented in a real classroom setting.
The findings presented are solely based on raw data provided from evaluation feedback forms filled out at the end of each semester by the students.

According to the study, students may facilitate learning by having a facilitator who is competent and able, being a part of a supportive learning environment, having consistent content and lectures in good timing and finally having learning materials that are also consistent. These subjects also answer the second questions relating to the lecturer’s background and teaching style and thus contribute to the students’ learning.

Feedback from the learners was analyzed using inductive qualitative content analysis to produce the above categories. The findings showed that learning took place throughout the learning sessions and statements from the students showed how their learning was facilitated over the course of the study. It was also displayed by the students’ comments that the lecture’s background is important in ensuring that learning takes place. For teaching nursing students, it’s important that the facilitator be of a nursing background. It is very easy for a lecturer to give too much information, or information that is extraneous and not necessary for nurses to learn. A good balance is good to ensure that students have the right amount of information for their future work.

Constructive learning is defined by Thanasoulas (2000, 42), as learning reflecting on our own experiences, which allows us to construct our own understanding of the world we live in. We each make our own rules and models which are then used to identify with our own experiences. Constructive learning is important in nursing education for the sake of building new knowledge based on past experiences. Reflective learning is described as learning which builds upon the constructionist approach and reflects upon past experiences creating transformational conditions of learning (Brockbank & McGill, 2007 62). The learner is able to be effective in his or her environment, development of the person is an aspiration and the learner is able to be critical in relation to the differing aspects of knowledge, self and the world. In essence, the learner is able to be reflexive about how he or she learns (Brockbank & McGill, 2007, 63). According to the findings, reflecting on learning based on past experiences ensures that students are responsible for their own learning and as such are facilitators of their own learning. Students also appreciate when they are respected as individuals as well as treated as learners by providing them with adequate and relevant information to support and enhance their learning.

While it is important for the facilitator, or lecturer, to be knowledgeable and able to give lectures, it is also necessary for the students to be accountable for their own learning. This is dependent, however, on the depth and breadth of students’ knowledge area or the amount of previous knowledge the students possess. In this case, there were some students who pos-
sessed a lot of previous knowledge, and some students who did not. In any case, the students were responsible for drawing upon their previous classes in anatomy and nursing interventions to be able to understand the material of fundamentals of pharmacology properly. Students participated actively in discussions, offered ideas, and shared their own experience either through their clinical rotations, personal experiences, or experiences of people close to them. Students listened to each other, which then led to cooperation and supporting their learning in the environment.

Students also revealed, through their comments that the materials given allowed them to increase their knowledge and give them tools for their future work. They admitted that the materials were practical and helped bridge the gap between theory and practice through the analyzing of case studies, for example. The relationship between the facilitator and the students was also vital in ensuring that learning took place. Students value when a facilitator has clear expectations of the students and says those expectations beforehand, yet at the same time gives the students freedom to express themselves as they need to. Facilitators should provide open, supportive learning environments where students are encouraged to share their opinions. Asking open-ended questions and then asking students “why” questions allow students to be both constructive as well as reflective in their learning.

Lastly, but certainly not least, it is absolutely crucial for students to have adequate time during a course to make sure information is properly absorbed and retained. Seriously planning the length of individual lectures as well as the entire course is necessary. Findings revealed while having shorter lectures supported their learning much better than having longer lectures, one-and-a-half hour lectures is perhaps too short and often times for the sake of time information was left out or rushed through just to end the lecture on time. In addition to having slightly longer individual lectures, findings displayed that students would actually prefer to have a much longer pharmacology course where twenty contact hours total is the bare minimum. Griffiths-Morrison et al (2002) support this by stating that students who have had fewer than twenty contact hours of pharmacology lessons tended not to retain any information after graduation. Students were very open with their desire for having more lessons and making the entire fundamentals of pharmacology course longer than just nine lectures lasting a total of eighteen contact hours.

In conclusion, all of the aforementioned suggestions by students or me imply that learning environment plays a large role in the facilitation of learning of nursing students in fundamentals of pharmacology. Interaction between students and facilitators play a major role in ensuring that such a supportive environment exists. In addition, the competence and ability of the facilitator is key in making sure students have such a supportive environment, and it would benefit nursing students if a pharmacology teacher had such a background in pharma-
colony and nursing. Timing of lectures and the course as a whole plays a major role in supporting learning and it is necessary that students receive enough contact hours to ensure information retention.

The analysis of the feedback from the students revealed answers to the research questions in a much larger extent than anticipated and provided answers which may be used to facilitate students’ learning in the future; although, there were some challenges and limitations which reveal that further study is necessary. In order to fully answer the third research questions pertaining to information retention, it would be necessary to test the student again after a year or so to further test the retention of students’ learning of pharmacology. Quantitative content analysis may also be in order to provide additional information. I, as the facilitator, was not a professional teacher, neither a graduate of pharmacology nor nursing studies, but I tried to follow ethically and comprehensively the role of a facilitator.

This study is only a small scale, Bachelor’s thesis study and in order to get more reliable information about facilitation of learning in pharmacology, further research is needed. My aim, moreover, was to describe different scenarios where learning can be facilitated amongst nursing students and thus, another study could be done to further test the methods and again retention of information. A research idea for the future would entail a study lasting much longer than a year, where the same group of students is tested again a year or two after the pharmacology course to see if information was remembered well by the student and content would be analyzed both qualitatively and quantitatively.

Despite some obvious lacking in the study, I believe that it has succeeded in providing students’ experiences in learning sessions and suggestions for further curriculum development at Laurea UAS. This has been one of, if not the only, first studies in Finland about pharmacology related to nursing studies and I believe this study can act as a stepping stone for other studies and promote active discussion amongst other Universities of Applied Sciences on the findings, and perhaps steps towards curriculum revision and development.

Above all, this has been a learning experience for me. Instead of producing major findings about how learning can be facilitated, this study has strengthened my understanding on the importance of having reliable and trustworthy in accurate reporting. Although this was a small-scale study, this paper has helped me grow as a professional nurse and even lecturer as I have been offered to teach the pharmacology course again to the next year students. This paper has shown me the importance of following good scientific practice and use the knowledge I already posses to enhance any new knowledge coming in from the study. In addition, this report has taught me the value of relationships amongst students and lecturers,
facilitators, or clinical tutors which will benefit me in my future work as a nurse either on the ward, or as a future, possible, lecturer at Laurea.
LIST OF REFERENCES


Laurea Otaniemi Study Guide. 2011. Soleops


Appendix 1 Syllabus

G038 Encountering the Nursing Client
G0244 Medical Assessment and Therapeutic Methods, 5cr

Description of the study unit:

Application of medical assessment and therapeutic methods in nursing

Key questions:
What are the fundamentals of pharmacology?
How do related sciences support medical assessment and therapeutic methods in nursing?

The student will be able to

- integrate knowledge of anatomy and physiology, clinical physiology, internal medicine and pharmacology to nursing,
- apply his/her knowledge of gerontology and different diseases in nursing,
  identify information acquired by medical examinations and therapeutic methods in nursing,
- provide safe pharmacotherapy

Fundamentals of Pharmacology, 2cr

The student will be able to:

- Know and understand the general principles of pharmacology
- Know and understand the nurse’s role in pharmacology
- Know and understand different drug classifications in gastrointestinal, circulatory, respiratory, endocrine, central nervous, and infectious pharmacotherapy
  - Apply knowledge of basic pharmacology into clinical pharmacology
- Understand the principles behind safe medication administration
- Relate and apply previous knowledge from anatomy, physiology, clinical physiology and internal medicine to pharmacological treatments of diseases and disorders

Contents and Schedule
Mon 9.5 12:30-14 - Orientation to and overview of pharmacology
Wed 11.5 10:15-11:45 - General principles of pharmacology,
Tue 17.5 10:15-11:45 Pharmacological concepts and clinical pharmacology
Fri 20.5 12:30-14 - Drug Treatment of Cardiovascular
Mon 14.9 10:15-11:45 - Drug Treatment of Respiratory Disorders
Fri 17.9 10:15-11:45 - Drug Treatment of Gastrointestinal
Tue 30.8 10:15-11:45 - Drug Treatment of CNS Disorders
Wed 28.8 12:30-14 - Drug Treatment of Infections and Antibiotics
Thu 31.8 10:15-11:45 Drugs acting on Endocrine system, Safe Medication Administration
Fri 1.9 12:30-14 - Orientation to exam and other information
Tue 11.9 9-11:30 - GROUP EXAM

Evaluation
80% Attendance (no more than 2 absences)
Active participation in discussions
In-class quizzes, group work etc.
Group EXAM at the end of the autumn term graded 1-5

Literature:
Appendix 2 Evaluation Feedback Form

Fundamentals of Pharmacology - Evaluation

1. Describe to the best of your ability how the content taught in the lectures this spring contributed to your learning of Fundamentals of Pharmacology

2. Describe to the best of your ability how the time given for the lectures contributed or did not contribute to your learning of Fundamentals of Pharmacology

3. Were the lectures engaging and did you feel able to learn and actively participate. Please describe why or why not.

4. Please give any positive feedback regarding the lecturer and the style of the classroom lessons

5. Please give any constructive criticism related to any aspect of the spring session: timing, content, style of lecturing