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Students' perceived experiences of a flipped classroom at a traditional South African university in comparison to the traditional classroom



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By

Liezel

Cilliers

**Students' perceived experiences of a flipped classroom at a traditional South
African university in comparison to the traditional classroom**

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Liezel Cilliers

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Dr J Pylman

Dr Melanie Drake

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Abstract

The purpose of this study was to explore students' perceived experiences of flipped classrooms at a traditional South African university in comparison to the traditional classroom. Universities across the world are confronted with a variety of problems. One of these challenges include the massification of higher education as more students now have access to universities resulting in larger class sizes and lower through put rates. Universities have traditionally made use of the face-to-face model of lectures and tutorials as a passive mode of course instruction and delivery. However, due to the massification of higher education, it has become very difficult for lecturers to communicate and collaborate with students. One of the ways that lecturers have attempted to overcome the problem of massification is to make use of technology to increase the delivery of course content. When lectures are made available online while the traditional class time is used to build conceptual understanding and cognitive skills among students, the approach is known as 'flipping' the classroom. Several studies have shown that this type of active classroom approach can perform better than traditional lectures when learning outcomes are compared. There is also a very limited  body of knowledge available regarding students' perceived experiences of flipped classrooms at traditional South African universities.

The theoretical frameworks guiding this study are the Activity Theory and Constructivism, whilst a pragmatic paradigm was employed. The flipped classroom was used in one course of the Management and Commerce Faculty at a traditional university in South Africa. The study was divided into three cycles: The first cycle involved 4 weeks of traditional lectures, the second cycle of 4 weeks introduced blended learning into the course, while the third cycle of 4 weeks changed the content delivery method to a flipped classroom. At the end of each cycle a formal evaluation through focus groups interviews (with 10 students per cycle) and a questionnaire (that was administered to the class) was conducted to inform the next cycle. Throughout the research process, the researcher also kept detailed field notes to as an account of the planning, execution and reflection for each class. The researcher also observed the behavior of the students during the various research cycles to provide a 'snapshot' of the classes. The results of the study suggest that students prefer the use of the flipped classroom is it enables them to communicate with their peers and the lecturer, and providing them with opportunities to better understand learning content through discussions and reasoning, rather than the means of

receiving information. Barriers that were identified included difficulty with learning strategies and technical assistance when students needed assistance. However, students were positive about both the use of the flipped classroom as opposed to the use of the traditional classroom.

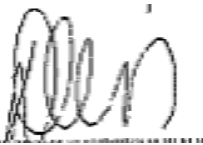
Keywords: experiences, flipped classrooms, students, traditional university, constructivism, activity theory



Declaration

I, **Liezel Cilliers**, hereby declare that:

- The work in this dissertation is my own work.
- All sources used or referred to have been documented and recognised.
- This dissertation has not previously been submitted in full or partial fulfilment of the requirements for an equivalent or higher qualification at any other recognised institution.
- I am fully aware of the University of Fort Hare's policy on research ethics and I have taken every precaution to comply with the regulations.

Signature: 

Date: 15 December 2017



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Chapter 1: Introduction

1.1 Background

Universities worldwide are confronted with a variety of problems. One of these challenges includes the massification of higher education as more students now have access to universities, resulting in larger class sizes and lower throughput rates (Baepler, Walker, & Driessen, 2014).

Traditional universities in South Africa provide a theoretical orientated degree programme to their students. Universities have traditionally made use of the face-to-face model of lectures and tutorials as a passive mode of course instruction and delivery (Butt, 2014). However, due to the massification of higher education, it has become difficult for lecturers to interact with students and estimate the level of understanding of the individual student until a formal assessment is conducted (Roehl, Reddy, & Shannon, 2013).  One of the ways that lecturers have attempted to overcome the problem of massification is to make use of technology to increase the delivery of course content. When class material is made available online while the traditional class time is used to build conceptual understanding and cognitive skills among students, the approach is known as 'flipping' the classroom (Baepler et al., 2014).

With the flipped classroom approach, the traditional lecture and content is moved outside the classroom. This means that the activities of understanding and remembering, as described in Bloom's Taxonomy of Learning, occur outside the formal class time. The higher order activities of the Bloom's Taxonomy (creating, evaluating, analysing and applying) are incorporated during class time in the form of case studies, discussion or simulations to allow the lecturer to assess the understanding of the students and correct any misconceptions immediately (See & Conry, 2014). This type of learning environment comprises of an active learning pedagogy and collaborative problem solving (Butt, 2014).

Several studies have shown that this type of active classroom approach can perform better than traditional lectures when learning outcomes are compared. This is mainly due to the lecturer's ability to assess the understanding of the coursework by the students as they interact during the activities in class time. The lecturer becomes a facilitator in the classroom that assist students towards active learning, which in turn mitigate some of the challenges presented by the massification and traditional pedagogy of learning (Baepler et al., 2014; See & Conry, 2014; Butt, 2014). However, there is still a shortage of research that evaluates students' perceived experiences of a flipped classroom at a traditional South African university. Most studies conducted in developed countries thus far focused on the perceptions of students of their learning in the flipped classroom, while the theoretical foundations and outcomes based on evidence of learning outcomes have not received much attention (See & Conry, 2014; Butt, 2014, Abeysekera & Dawson, 2015; Triantafyllou, Timcenko, & Busk Kofoed, 2015).

1.2 Background of the Problem



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The demand for higher education services are increasing worldwide as more young people are able to access tertiary education. South Africa has seen a 60% (from 590,000 to 938,000) increase in the number of students entering the higher education sector to pursue a qualification over the past 20 years (McGregor, 2014). Massification of higher education in developing countries, such as South Africa, is deemed necessary as it redresses the backlog of racial/ethnic inequality. The goal of the massification of education is to increase the societal wellbeing, economic empowerment, and participation of a previously marginalised citizenry (McGregor, 2014). The reason for this is that more graduates are needed in order to grow the competitive workforce and build the South African economy (Strydom, Mentz, & Kuh, 2010).

However, the massification of higher education has been attributed as one of the reasons for the poor throughput rate of undergraduate students. The Council on Higher Education (2013) states that 55 % of first year students will not graduate, while 75% of the remaining students will not complete their degree in the specified

time for an undergraduate degree (Teferra, 2014). Prosser and Trigwell (2013) state that massification decreases the quality of education as the student-lecturer interaction is reduced due to large classes and the poor academic literacy of students. To counter these problems, the national government has developed the National Development Plan (NDP) 2030 that sets goals for tertiary education. According to the NDP, universities should accept students who are less prepared academically and provide them with targeted support. In addition, universities must incorporate and adapt to changes in technology, industry, population and global trends (National Development Plan, 2011).

Technology is a useful tool to facilitate effective communication among students and lecturers and thus has the potential to increase throughput rates and student pass rates (Renes & Strange, 2011; Nurulrabihah et al., 2013). Liu, Wu, and Chen (2013) define technology integration in universities as the “the amalgamation of a wide range of electronic devices and software that can be used to support education, learning and assessment at higher education” (p. 3).



One of the recent technological developments that have been introduced in teaching and learning is the ‘flipped classroom’ or ‘flipped learning’. Flipped learning is a new pedagogical approach that moves direct, and often passive, instruction from the classroom to the individual learning space. Students have to prepare for the class by reading, watching recorded lectures, or listening to podcasts. The lecturer then uses the classroom as a dynamic, interactive, learner-centric learning environment to apply concepts and engage creatively in the subject matter (Govender & Maharaj, 2006). The purpose is to apply the knowledge that the students received prior to the class in order to problem solve with their peers (Berrett, 2012). This approach has the advantage that it will increase collaboration among students and the lecturer, allowing for a more meaningful relationship between the various parties, as opposed to traditional classrooms where students listen to lectures and subsequently complete required tasks and assignments.

However, there are some challenges or barriers associated with this teaching pedagogy. These include the awareness and acceptance of the flipped classroom concept among lecturers and students, a lack of information technology support to

implement the approach, and poor planning on the part of lecturers to incorporate the flipped classroom in their teaching pedagogy (Bingimlas, 2009; Schoepp, 2005; Govender & Maharaj, 2006). The next section will discuss the research problem.

1.3 Statement of the Problem

The University in this study is a public university and is located in the Eastern Cape Province of South Africa. The university has three campuses located in an urban area, semi-urban area and rural area (Teferra, 2014).

The low throughput rate at the university has in part been contributed to the trend of massification at the University (Tom, 2011). In addition, the traditional lecture format is not the most effective way for the majority students to learn as students do not receive the necessary support to learn in a big class (Butt, 2014). To address this challenge, a learning environment needs to be established which supports favourable teaching and learning of students. A number of universities in South Africa have chosen to integrate technology in their curriculums in order to do so (Bati, Gelderblom, & van Biljon, 2015).



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However, the utilisation of flipped learning at universities is still low due to a number of barriers. These barriers include the limited knowledge and proficiency required to use the concept effectively as a pedagogical tool amongst lecturers (Tarantino, McDonough, & Hua, 2013). While the flipped classroom has been used in different domains, the higher education domain has lagged behind. Sohrabi and Iraj (2016) state that only a few studies have reported on the implementation and student acceptance of the flipped classroom in this domain. There is also a limited body of knowledge available regarding the implementation of this teaching approach in developing countries, and especially in South Africa (Le Roux, 2014; Butt, 2014). This study then seeks to investigate students' perceived experiences of a flipped classroom at a traditional university in South Africa.

1.4 Main Research Question

In order to address the research problem, the following research question was investigated in this research.

What are students' perceived experiences of a flipped classroom at a traditional South African university in comparison to the traditional classroom?

1.4.1 Sub-Research Questions

In order to answer the above research question, three sub- research questions were formulated:

- Which one, if any, of these approaches are perceived or experienced to promote a more positive experience for students.
- What are the perceived barriers (challenges) that might influence the students' experiences of a flipped classroom at a traditional university in South Africa?
- How might the perceived barriers (challenges) that will influence the students' experience of the flipped classroom at a traditional university in South Africa be mitigated?



1.5 Purpose of the Study

The purpose of the study was to explore students' perceived experiences of a flipped classroom at a traditional South African university in comparison to the traditional and blended classroom.

1.6 Research Objectives

The objectives of the study are to:

- Determine which one, if any, of these approaches are perceived or experienced to promote a more positive experience for students.
- Determine the perceived barriers (challenges) that might influence students' experiences of a flipped classroom at a traditional university in South Africa?

- Determine how the perceived barriers (challenges) that will influence the students' experience of the flipped classroom at a traditional university in South Africa could be mitigated?

1.7 Significance of the Study

Flipped learning is a new pedagogical approach that moves direct, and often passive, instruction from the classroom to the individual learning space. The use of flipped classrooms might enable students to be actively involved in their studies as they have to prepare for class by reading, watching recorded lectures, or listening to podcasts, thus, it might promote active engagement in their studies. This study might also promote a more dynamic, interactive, learner-centred learning environment for lecturers and students. The massification of higher education has been attributed as one of the reasons for the poor throughput rate of undergraduate students and this strategy might assist lecturers to cope with overcrowded lecture rooms. This study might also generate knowledge for students on the effective use of technology to enhance their learning and understanding of content material, thus improving students' learning experience in an efficient and cost-effective manner.



1.8 Delimitation

The study focused on one traditional university situated in the Eastern Cape Province of South Africa. Only one undergraduate course run in the second semester of the 2016 academic year was included in the study.

1.9 Definition of Key Terms

Flipped classroom	Flipped learning is a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter (Flipped Learning Network, 2014). The flipped classroom in this study is taken to mean that the traditional
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	classroom content will be recorded by the lecturer and made available to the students before class in order to familiarise themselves with the content. The lecturer will then use the time within the class for group based, problem- solving activities in order to encourage higher order thinking and increase the interaction of the students with their peers and lecturer.
Blended learning	A mode of instruction that combines face-to-face classroom time with online instruction (Baepler et al, 2014). In this study the second phase of the cycle will involve blended learning where traditional teaching will be combined with online resources in the class.
Active learning	An instructor stops lecturing and students work on a question or task designed to help them understand a concept (Andrews, Leonard, Colgrove, & Kalinowski, 2011). In this study, active learning will be used in the flipped classroom by making use of activities such as group work, case studies and role play.
Student-centred learning	Student-centred learning is based on the constructivism learning theory that postulates the learning as an active constructive process (Prince , 2014). In this study the classroom will be changed from lectured-centred to student-centred learning by making use of the flipped classroom.

1.10 Review of literature

In this section, the review of the theoretical and empirical literature is provided. According to White (2003), a literature study forms a central part of the research process and will contribute to the researcher's frame of reference as it provides a clear understanding of the nature and meaning of the research question.

1.10.1 Theoretical Overview

The theoretical frameworks guiding this study is Engestrom's Expended Activity Theory Model (Engestrom, 2001) and Constructivism.

1.10.1.1 Activity theory

The Activity Theory is a conceptual framework based on the idea that activity is primary. In this theory the notion of doing precedes thinking and that goals, images, cognitive models, intentions, and abstract notions like “definition and determinant grow out of people doing things” (Morf & Weber, 2000, p. 81). According to Hashim & Jones (2007) the Activity Theory uses the whole work activity as the unit of analysis, where the activity is broken into analytic components of *subject*, *tool* and *object*. The *subject* is the person being studied, the *object* is the intended activity, and the *tool* is the mediating device by which the action is executed. Furthermore, Engestrom's modification of Vygotsky's original theory provides for two additional units of analysis, which have an implicit effect on work activities. The first are *rules*, these are sets of conditions that help to determine how and why individuals may act, and are a result of social conditioning. The second is *division of labour*, this provides for the distribution of actions and operations among a community of workers. These two elements affect a new plane of reality known as *community*, and through this, groups of activities and teams of workers are anchored and can be analysed (Hashim & Jones, 2007).

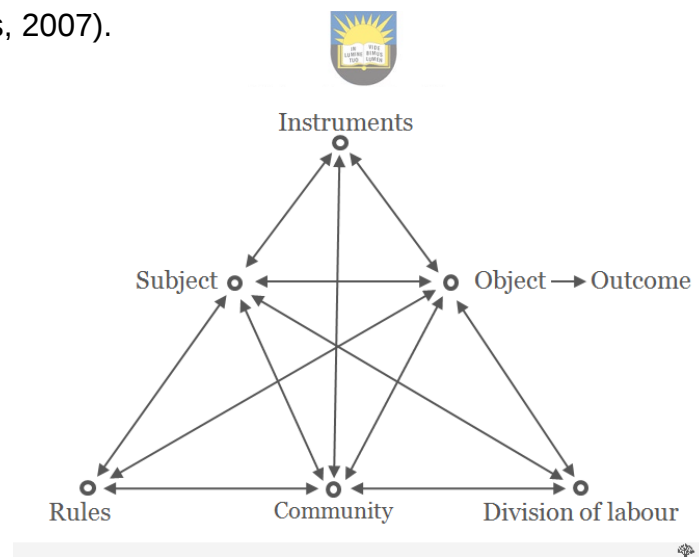


Figure A: Engestrom's Expanded Activity Theory Model (Engestrom, 2001)

Based on the above views of Engestrom, the Activity theory (Figure A) sees the integration of technology as tools which mediate social action. Hashim & Jones (2007) assert that these tools comprise artefacts, which include instruments, signs, language, machines and computers. These authors further argue that the relation between subject and community is mediated by *rules* and the relationship between object and community is mediated by the *division of labour*.

1.10.1.2 Constructivism

There is no consensus as to how constructivism can be defined in the field of education. Most often, scholars use qualifiers to validate what they understand under the theme of constructivism. This has led to two schools of thought in the field: individual and cognitive constructivism (referring to the work of Jean Piaget about the theory of cognitive conflict), and social constructivism (referring to the zone of proximal development advocated by Lev Vygotsky) (Svein, 2007; Bishop & Verleger, 2013).

Making use of constructivism, knowledge is constructed by the student as new information is linked to prior knowledge. The flipped classroom allows the student to construct knowledge actively as they prepare for class. This knowledge is then tested as the lecturer provides a learning environment in the classroom that supports the learner's efforts to acquire new knowledge and challenge them to make use of it to solve real-life problems (Sohrabi & Iraj, 2016). Therefore, the theoretical foundations used for justifying the flipped classroom typically focus on reasons why classroom time is not used to deliver lectures. These theoretical foundations stem from a large body of literature that deals with student-centered learning (Bishop & Verleger, 2013). In this study, social constructivism will be used as the population of the study refers to the experiences of the student body as a whole and not the individual student.

The qualifiers of social constructivism which are relevant to this study are as follows:

- Constructivism provides for the students to 'construct their own knowledge' (Sener, 1997). This means that students become active participants in the learning process as they are encouraged to seek the meaning in their experiences (subjective), which then become part of their knowledge. This approach is the foundation of the flipped classroom as students prepare for classes on their own by watching or listening to recordings. Knowledge is thus actively constructed by the learner, not passively received from the lecturer (Taber, 2006).

- The purpose of preparing prior to the classroom is based on reducing the cognitive load on the learners which allows the student to process information more efficiently. Studies have reported a significant relationship between prior preparation for class and the mental effort of students, which states that students need fewer cognitive resources to learn new concepts with this approach (Flipped Learning Network, 2014).
- Although each student's subjective experience will be different, each is considered just as valid as those of their peers. Therefore, there are no objective criteria for what constitutes knowledge (Boghossian, 2006). Learners come to the learning situation in class with existing ideas about the course content which may not always be correct. The activities in class are then designed to promote a deeper understanding of the content which involves creating, evaluating, analysing and applying the knowledge (See & Conry, 2014).
- In constructivism the teacher is no longer the center of knowledge, but is replaced with the learner as each learner's subjective experiences have a unique meaning. Teaching has to take the learner's existing ideas into consideration if they want to change or challenge these subjective experiences (Taber, 2006). The flipped classroom allows the teacher to understand the subjective experiences of the learner and guide the student towards the correct understanding of the content.
- Although knowledge is considered to be personal and individual, the learners construct their knowledge through their interaction with the physical world, collaboratively in social settings, and in the cultural and linguistic environment (Svein, 2007). This approach speaks to Vygotsky's theory that stresses the fundamental role of social interaction in cognition development. The zone of proximal development points to the difference of what the students can learn on their own, and what they can learn with the guidance and encouragement of a knowledgeable person (McLeod, 2007). The flipped classroom allows the students to work in groups and learn from each other while the teacher becomes a facilitator in this process. This means that the teacher's role is no longer only to structure in-classroom time but now also incorporates providing learning resources that can be used before or after class by the student. This

allows the students to move at their own pace through the learning material, thus personalising instruction (Davies, Dean , & Ball, 2013).

It is thus clear that the flipped classroom is grounded in constructivism and allows for a student-centred approach where students can learn from the lecturer, who now becomes a facilitator, and their peers. This approach also allows students to adapt the classroom material for their own needs and learn according to their own pace. However, for students to gain the most from the flipped classroom, the factors that will influence their experience with and learning in this environment must be identified. The next section will discuss some of the research studies that have been published on the flipped classroom from around the world.

1.10.2 Empirical studies

Students entering higher education today are referred to as millennial students or 'digital natives' (Prensky, 2010). These students have been exposed to information technology from a young age and therefore expect ubiquitous information connectedness. As a result of technologies, such as social media, this group also enjoys group activities and the social aspect of learning (Roehl et al, 2013). The requirements of this group are therefore in stark contrast to the traditional lecture-based teaching methods found in higher education. Lecture-based teaching relies on rote memorization of knowledge and facts known as surface learning. This method is also a teaching-centered paradigm. With the introduction of technology in education, lecturers are now able to move to a learner-centered paradigm where deep learning is encouraged by making use of active and constructive processes (Ritchhart, Church, & Morrison, 2011).

The flipped classroom is a teaching pedagogy that enables the lecturer to introduce a learner-centred paradigm into their classroom. The approach has been used previously, without the aid of technology, when students were asked to read a novel before class while the lecturer then uses the class time to discuss the plot or characters in the novel (Berrett, 2012). The characteristics of a flipped classroom are as follows (Bergman & Sams, 2012; Abeysekera & Dawson, 2015):

- Students must become active students, not just passive recipients of knowledge (Learning strategy of students must change);
- Technology is used to facilitate active learning (Technical assistance may be required from time to time);
- Class time and traditional homework time are exchanged – home work is done first;
- The time spend in class is transformed into personalized instruction (these two bullet points refer to the teaching strategy of the lecturer); and
- Time in class is spent solving real-world scenarios in order to help students grasp challenging concepts or to engage in higher order critical thinking and problem-solving making use of active learning and peer learning (communication with peers and lecturer is encouraged through these learning activities).

Figure 1 below illustrates these flipped classroom characteristics. During the first stage students gather information, while the second stage is used to assimilate the information. The first stage is automated making use of technology where the student will gather information that was prescribed by the lecturer. The second stage is performed in the classroom where the lecturer provides opportunities for the student to assimilate the information, most often in a group situation (Bishop & Verleger, 2013).

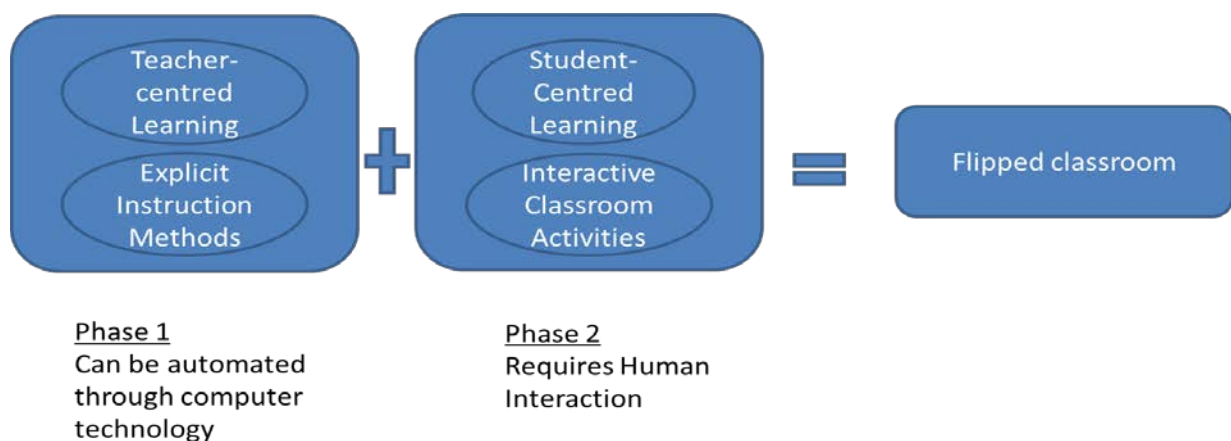


Figure 1: Flipped classroom activities (Bishop & Verleger, 2013)

1.10.2.1 Advantages and disadvantages of the flipped classroom

Studies have found that there is resistance to the flipped classroom approach. The resistance is mostly found when the approach is first introduced, but there are some

students that remain opposed to the flipped classroom despite the advantages it poses (Baepler et al, 2014). These are mostly students that dislike group learning activities or prefer doing assignments on their own (Roehl et al, 2013). Fulton (2012) states that the advantages of the flipped classroom includes that students can learn the material at their own pace while the in class activities provide the lecturer with better insight into student difficulties as they can use the time more effectively and creatively. The class content is available to students 24/7 via technology. Lecturers have also reported increased levels of student achievement, interest and engagement with the learning material as they are more actively involved in the learning process. Students that have missed class can watch the lectures at any time so that they do not fall behind.

1.10.2.2 Success factors for the flipped classroom

There are two main success factors that have been identified in the literature as the foundation of the flipped classroom. These include awareness and training of the flipped classroom approach and equal access to technology (Sohrabi & Iraj, 2016). Lecturers often do not have the knowledge of how to incorporate the flipped classroom into their teaching pedagogy. Roehl et al. (2013) state that there are four categories of instructional approaches that can be used for active learning in the classroom. These include individual activities, paired activities, informal small groups, and cooperative student projects. Typical activities that can be used during these approaches include conceptual mapping, brainstorming, collaborative writing, case-based instruction, cooperative learning, role-playing, simulation, project-based learning, and peer teaching.

The second success factor, access to technology applies to both lecturers and students. Technology is an integral part of the flipped classroom. Berrett (2012) states that technology has made it possible for lecturers to either produce their own videos or access lectures by leading authorities on the subject at no cost. Students can also access these resources from anywhere, meaning that learning is no longer relegated to the classroom. This type of differentiated instruction provides for the students to learn at their own pace and create flexibility in the content that is being presented (Roehl et al, 2013).

However, technology at universities has been limited to computer programs intended to supplement the work of lecturers thus far, e.g. processing software programmes or learner management systems. Technology has not been integrated directly into classroom instruction, which means that a teaching pedagogy shift will have to be emphasised among lecturers (Davies et al, 2013). The next section will discuss the research methodology of the study.

1.10.2.3 Examples of the flipped classroom

A literature review of the flipped classroom in higher education was conducted in 2015 by O'Flaherty and Phillips. During the review a total of 28 articles were identified that were published during the time period 1994 – 2014 on the topic. The review found that the articles were published from 2013, indicating the novelty of the research topic area. Most of the studies (23) were conducted in the United States of America, while the rest of the studies originated from Australia (2), the United Kingdom, Malaysia and Taiwan. The collective results from these studies indicate that indirect evidence of increased academic performance and student and staff satisfaction with the flipped approach are being reported, but there is still a lack of conclusive evidence that it will contribute to building lifelong learning in higher education (O'Flaherty & Phillips, 2015).

In South Africa a few research studies on the making use of the flipped classroom in higher education have been published in recent years. These studies are mostly limited to observations from the perspective of the lecturers in their attempts to implement a flipped classroom. Mulder and van Oordt (2015) conducted a pilot study in an undergraduate taxation class at the University of Pretoria. Le Roux (2014) reported that the flipped classroom had positive results among students in a rural campus of the University of the Free State. The next section will discuss the research methodology used in this study.

1.11 Research Methodology

DePoy and Gitlin (2015) define research as “multiple, systematic strategies to generate knowledge about human behaviour, human experience and human environments in which the thinking and action processes of the researcher are

clearly specified so that they are logical, understandable, confirmable, and useful” (p. 1). This section discusses the research methodology that will be used to conduct this study. The research paradigm, approach and design will be dealt with in the next sections. Thereafter, the study population and sampling techniques was investigated, followed by the data collection tools and data analysis methods that was utilised in the study. Measures to ensure the trustworthiness of the collected data was also considered.

1.11.1 Research Paradigm

Collis and Hussey (2009) describe a research paradigm as an accepted model or pattern that guides the researcher on how the research should be conducted. This research leaned towards the interpretivist paradigm, which is based on the belief that reality is constructed by people’s perception and social actors (Wahyuni, 2012).

Exploring students’ perceptions on flipped classrooms in the lecture room allowed the researcher to make subjective interpretations of phenomena in a natural environment. Thus, the combined use of the positivist and interpretivist paradigms (pragmatic approach) in its methodology was deemed relevant to this study as it aimed to determine whether flipped classrooms or traditional classrooms promote a positive learning environment for students. This paradigm was considered appropriate for this study as it allowed the researcher to generate information on students’ perceived experiences of flipped classrooms at a traditional South African university. This paradigm provided relevant information in terms of the students’ experience of the research problem and the subjective meanings that underpin the social interaction in the classroom.

1.11.2 Research Approach

This study used a mixed method, exploratory research design approach as both quantitative and qualitative data was collected (Punch, 2014). Qualitative data was collected from both the students and lecturer. Inductive reasoning will be used to generate new theories from the data collected (Gabriel, 2013). This type of reasoning is appropriate for this study as the qualitative data that was collected was

analysed to form broad patterns or themes that can be used to determine the factors that will influence the students' experience with a flipped classroom at a traditional university in the Eastern Cape. After the qualitative data was collected, quantitative data was collected from the students to confirm the conclusions that were drawn from the qualitative data.

1.11.3 Research Design

The research design that was employed in this study is action research. The purpose of undertaking action research is to bring about change in specific contexts, in this study to change the teaching method from the traditional lecture method to a flipped classroom method. The action research design allows the lecturer to make use of systematic enquiries in order to assess the intervention (flipped classroom), which in turn can enhance their teaching and the students' learning experience (Whitelaw, Beattie, Balogh, & Watson, 2003).

There are several characteristics that set action research apart from other research. Fook and Hoong (2013) provide the following list of action research characteristics:

- Action research is situation and context specific – the study was conducted in 1 semester class with a group of second year students registered for the Introduction to Database course;
- Action research involves action, evaluation, and critical reflection and changes in practice are then implemented after the results have been analysed – The study was divided into three cycles. The first cycle involved 4 weeks of traditional lectures, the second cycle of 4 weeks introduced blended learning into the course, while the third cycle of 4 weeks changed the content delivery method to a flipped classroom;
- Action research is participative and collaborative – The flipped classroom is not possible without the participation of the students. Throughout the 3 cycles the lecturer involved the students by asking them to complete a questionnaire at the end of each cycle which was then be used to inform the next cycle. The results of these evaluations was shared with the students as well as the interventions that will occur in the next cycle;

- Knowledge is created through action and at the point of application – The evaluations with the students was used to create knowledge and inform the study;
- Action research can involve problem solving, if the solution to the problem leads to better practice – The research problem investigated in this study was the poor communication and collaboration in classroom.

Whitelaw, Beattie, Balogh and Watson (2003) state that action research is a commonly used method for scholarship of teaching because it provides the means to increase teaching practice. The scholarship of teaching is concerned with conducting research, identifying gaps, investigating alternatives, and correcting shortcomings in the teaching practice. This makes action research appropriate for this study as it can be used to evaluate and inform the future teaching practices of the lecturer.

1.11.4 Population and Sampling

Engel and Schutt (2013) define a sample as a subset of a population that was used to study the population as a whole. This study will make use of action research, with the implication that the entire population will be part of the study. One hundred and thirty (130) students were registered for the module which became the study population.

Purposive sampling was used to determine which of the students will be part of the focus group that will evaluate the different three different cycles. Silverman (2010) argues that many qualitative researchers employ purposive instead of random sampling techniques. The reason for this is that qualitative researchers will seek out groups, settings and individuals where the processes being studied are most likely to occur. Purposive sampling was therefore relevant in this study as the goal is to find students who are willing to describe their experiences related to the phenomenon in question - the transition from a traditional lecture based to a flipped classroom. The lecturer then approached students who was considered good candidates to participate in the focus groups (10 students per cycle). However, the entire class was asked to participate in the final class evaluation at the end of each cycle.

1.11.5 Data Collection Instruments

Primary data is raw, unprocessed data collected for a specific research, while secondary data is data previously collected by a researcher for a different purpose (Oates, 2006).

Focus groups

A focus group is a guided discussion making use of a facilitator that used semi-structured questions to ensure coverage of important issues while allowing for flexibility in responding to group-initiated concerns. The most important benefit of this data collection technique is the additional insight gained from the participants' interaction of ideas. However, if some of the participants are introverted; they may not be comfortable providing their opinion in front of other participants. In contrast, some participants may dominate the discussion, not allowing the others to participate. Therefore it is important to choose the participants and facilitator of a focus group carefully (Mertens, 2005).

This study collected data from a focus group after each cycle was completed. The researcher approached 10 students that were willing to participate in each of the focus groups. Also, the focus groups made use of an external facilitator. The questions was identified during the literature review from previous studies such as articles from academic journals, books in both print and electronic formats, conference proceedings, relevant websites, and theories relating to this study. Electronic databases such as ACM Digital Library, Sage Online Journals, Science Direct, Springer Link and Sabinet Reference will be used to find relevant literature.

Field notes

Punch (2014) distinguishes between documents that are prepared for personal use and records that are created for official reasons. Qualitative researchers can use both documents and records to investigate the background and gain insight into current dynamics of their research problem.

In this study, documents was used to collect data about the researcher's experience during the cycles. Field notes was used to keep a detailed account of the researcher's planning, execution and reflection of each class that is prepared during

the study. These notes also aided the researcher in strengthening the trustworthiness of the data collected during the study.

Observation of the class

Observation most often occurs in the naturalistic setting without using predetermined categories of measurement or response (Mertens, 2005). In this study the researcher was interested in observing the students' behaviour as it they naturally occur during the class period in a way that that will be meaningful to the students. The objective of this type of participation in this study was to provide a 'snapshot' of the students' behaviour during the various cycles.

This means that the researcher (and lecturer) made use of participant observation as they interact with the students while collecting data about the class. According to the types of participation that Spradley (1980) proposed, the researcher was a complete participant as she are a natural participant in the research process while collecting data from the students. The disadvantage of this approach is that the researcher is collecting data while maintaining a questioning and reflective stance. In order to overcome this disadvantage, the researcher needs to consider the 'insider' perspective.

Class evaluation

At the end of each cycle, an electronic evaluation was conducted with the entire class as to their experiences during the 3 cycles of teaching. The evaluation provided quantitative data to support the qualitative findings that were collected during the term. The questionnaire provided all the study participants the opportunity to contribute to the evaluation of the 3 teaching methods: traditional, blended and flipped classroom.

1.11.6 Data Trustworthiness

Validity of research data refers to the extent to which the data that have been collected accurately measures what they are intended to measure. The validity of

qualitative data refers to the trustworthiness of the data (Mertler, 2012). Trustworthiness of qualitative data refers to the credibility, dependability, transferability and confirmability of the data.

Credibility refers to the results obtained from qualitative research is believable from the perspective of the participant in the research (Mertler, 2012). In order to ensure credibility of the results, the following measures will be taken:

Credibility was addressed by making various observations during different classes, various times during the class period, and during various phases of the 3 cycles. This procedure is called prolonged engagement and persistent observation.

Member checking was used where the researcher makes their notes and transcripts available to the supervisor while the findings of the study will be shared with the students. This will ensure that the students' opinions and views were represented correctly by the researcher. The supervisor can be used as an objective observer that can make sure that the conclusions drawn from the notes and transcripts are valid.



The study used data triangulation to ensure the trustworthiness of the research data. Data was collected making use of field notes, focus groups, interviews and a formal evaluation of the course. The data from the various sources provide support for the findings as it agrees with each other.

Reflexivity was used to overcome the 'insider-outsider' ethical problem in this study. The researcher conducted the study within a population (students registered for a course that the researcher is responsible for) of which they are also a member. This allows the researcher to share the identity, language and experiential base with the students. The membership role provides the researcher with legitimacy and acceptance in the classroom which means that the students are more likely to provide a greater depth to the data gathered (Dwyer & Buckle, 2009).

However, as Adler and Adler (1987) point out, this dual role does mean that the researcher may struggle with the role conflict that they find themselves in when responding to the students and analysing the data. In this regard, reflexivity will be

used to ensure the credibility and trustworthiness of the study's findings. Reflexivity is the "active acknowledgement by the researcher that her/his own actions and decisions will inevitably impact upon the meaning and context of the experience under investigation" (Horsburgh, 2003, p. 309). The researcher will maintain a research log, repeatedly review the data gathered, and use peer consultation to self-scrutinize the lens through which the researcher views the study (Berger, 2013).

Dependability refers to the ability of the researcher to account for and describe the changes that occur in the research setting and how these changes affected the way the researcher approached the study (Mertler, 2012). The researcher kept detailed and comprehensive field notes that will allow cross-checking the observational findings with other researchers. This will eliminate inaccurate interpretations as a dependability audit can be conducted.

Transferability refers to the extent to which the findings can be applied in other contexts or with other respondents (Mertens, 2005). The researcher provided a 'thick description' of the research setting and findings.

Confirmability refers to the researcher's ability to track the data collected to its source while the logic that is used to interpret the data should be made explicit (Mertens, 2005). In order to accomplish these tasks, a confirmability audit should be conducted that includes the recorded focus groups and interviews be transcribed verbatim to ensure the accuracy and traceability of the results.

1.11.7 Data Analysis

Johnson and Christensen (2012) state that qualitative data analysis typically involves the analysis of text from interviews or field notes transcripts. Data collected in this study made use of qualitative data collection methods. The data collected was analysed by making use of descriptive analysis which includes transcribing the data, segmenting and coding the data, counting words and code categories, searching for

relationships and themes in the data, and interpreting the data. In order to complete all these steps, the qualitative data analysis tool NVivo was used.

The quantitative data collected via the final evaluation was analysed and the responses summarised to be meaningful and to identify trends through the use of descriptive statistics. SPSS was used to analyse the data and present the mean, maximum, minimum and standard deviation. Graphs, tables and charts was used to present the findings for each cycle.

1.12 Ethical Issues

This study complied with the ethical regulations stipulated by the University of Fort Hare's Research Ethics Committee. Therefore, ethical approval will be applied for from the University's Research Ethics Committee.

Oates (2006) identified the following rights which will be presented to the participants during the data collection for this study:

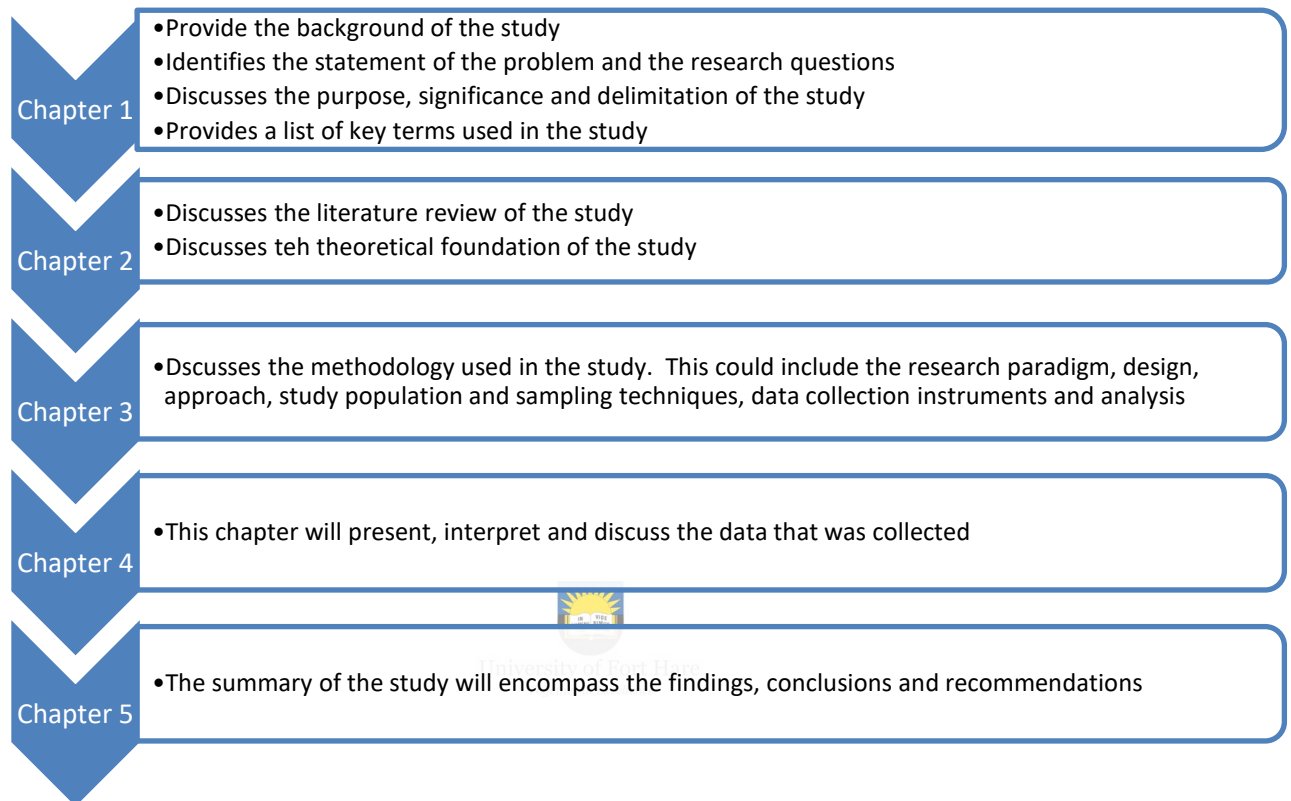
Wilful participation – Participants was encouraged to participate in this research willingly and without any due force.  Students was encouraged to participate in the focus groups, interviews and final evaluation, but will not be forced to do so.

Withdrawal – Participants was allowed to withdraw from participating in this research at any time that they feel their rights are not being considered. Students that have participated in the focus groups or interviews was able to withdraw from future activities without any fear of prejudice.

Informed consent – Prior to the collection of the data, the participants was informed of how the data collected from them will be used, as well as any third parties that may have access to it. Students was informed at the start of the course that there will be 3 teaching cycles and that the data collected will be used for the purposes of a study.

Anonymity – Participants' identity and location was withheld unless they provide explicit permission for it to be disclosed. Students that participate in any of the data collection methods was be identified in any way when data is collated. Students was given a pseudonym where their opinions are used verbatim in the text.

1.13 Chapter Outline

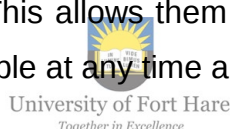


Chapter 2: Literature study

2.1 Introduction

The higher education system in South Africa has been given two mandates by the National Government of South Africa. On the one hand, it needs to produce quality graduates that will increase the economy of the country, but on the other hand, it must also increase the accessibility of higher education to those that were previously disadvantaged. Now, these two goals seem to be contradictory, as is evident from the multiple student protest actions that the country have experienced in recent years.

At the same time, the expectations of students in regards to their learning environment has also evolved. Technology has permeated the daily lives of students entering higher education with the result that students expect technology to be part of their educational experience. This allows them the flexibility to learn at their own pace and makes resources available at any time and place.



This chapter will introduce the history of higher education in South Africa including the legislation that governs the sector. Problems within higher education will be discussed including the massification of higher education in South Africa. The traditional course delivery methods in higher education will be discussed as well as how e-learning and blended learning can change the teaching approaches in higher education. There after the flipped classroom will be introduced including the pedagogy, advantages and disadvantages associated with the teaching approach. Finally, the use of the flipped classroom in the South African higher education context will be discussed.

2.2 The history of higher education in South Africa

Higher education in South Africa does not exist in a vacuum, and has been influenced by the legacy of the apartheid system. In 1953, the then National Party government made the decision to racially and geographically segregate as well as financially disregard schooling for black South Africans. The consequence of this

decision meant that education for black students consisted of inadequate infrastructure, unqualified educators, large learner: teacher ratios and a biased curriculum (Organisation for Economic Cooperation and Development, 2008). In 1986, the national government was spending nine times more on white learners than it spent on learners in the worst off black schools (Department of Education, 2007).

This meant that the Government of National Unity in 1994 had to evaluate and restructure the education system in South Africa in order to address the inequities and fragmented system of the past. In 1996 the values of human dignity, equality, human rights and freedom, non-racism and non-sexism and the guaranteed right to basic education for all were adopted in the Constitution, which provided the values for the the Department of Education to further transform while national, provincial and local spheres of government worked together to incorporate these values into the Educational system. Subsequently the National Education Policy Act of 1996 was enacted to set the political agenda and determined the national norms and standards for education planning, provision, governance, monitoring and evaluation. In 1997 the Education White Paper provided a programme for the transformation of higher education focusing on increased and broadened participation, responsiveness to societal interests and needs, and cooperation and partnerships in governance (Department of Basic Education, 2013) .

The Department of Education was divided into two ministries in 2009. The Department of Basic Education aims to create, maintain and support a system of education in South Africa that ensures access and equal education to all learners, while the Department of Higher Education and Training provides access to knowledge and skills relevant to the economical and societal dynamics through higher education (Matoti, 2011; Department of Basic Education, 2013). The National Government also remains responsible for the legislature that governs higher education in South Africa. There are 3 types of public higher education institutions in South Africa – universities, technikons and colleges. Traditional universities typically offer a theoretically-orientated bachelor degree that can range from 3-6 years of study depending on the discipline, a honours degree, master's degree and doctorate

degree. In addition, universities also offered a wide variety of certificate and diploma programmes in various disciplines (Higher Education South Africa, 2005). Universities of technology, or technikons, provide vocational orientated diplomas and degrees in the technical and professional field which range from national certificates (one year course) to national higher diplomas (four year course). In addition, technikons may also offer degree programmes in technology. The third type of university is called a comprehensive university and offer a combination of both types of qualifications. Lastly, colleges typically offer only certificate and diploma courses in a specific discipline e.g. education, nursing or agricultural (UNESCO, 2006; Higher Education South Africa, 2005).

In order to standardise the national learning system and integrate education and training at all levels, the South African Qualifications Authority (SAQA) Act of 1995 provided for the establishment of the National Qualifications Framework (NQF). The NQF was implemented with the intention of integrating education and training, in order to boost skill and productivity levels, promote stronger economic growth, as well as addressing issues of equity and social justice. The last Act that must be mentioned in the South African higher education context is the National Student Financial Aid Scheme Act of 1999 that provided for the granting of loans and bursaries to eligible students at public higher education institutions, as well as the administration of such loans and bursaries (Organisation for Economic Cooperation and Development, 2008; Department of Education 2007). The next section will discuss the future of higher education in South Africa.

2.3 National Development Plan 2030

The National Government has proposed the National Development Plan (NDP) 2030 that among other things sets goals for higher education. According to the NDP, higher education should accept students who are less prepared academically and provide them with targeted support to complete their studies successfully. In addition, higher education must incorporate and adapt to changes in technology, industry, population and global trends. The expected output of higher education institutions by 2030 is rather ambitious with one in six people being a graduate of a

bachelor's degree. This represents a 300 percent increase in the graduation rate of higher education institutions over the next 14 years. The NDP envisions that most of these graduates will complete their degree in the critical skills categories such as engineering, actuarial science, medicine, financial management and chartered accountancy. This means that in order to achieve this goal, the amount of learners who pass matric with the subject mathematics must be increased. Currently, the trend is for students to choose mathematical literacy as a subject instead of Mathematics. As a result, between 2008 and 2011, learners choosing Mathematics as a subject in secondary schooling decreased from 56% to 45% (Spaull, 2013; National Development Plan, 2011).

While it is clear that the targets in the NDP is rather ambitious, there is no concrete plan as to how these targets will be achieved or where the resources necessary will be sourced. This result in a situation where academics are expected to increased their own research output while providing extra support for the ever increasing number of undergraduate students without the necessary increase in resources (Cilliers, 2016). The next section will discuss the general problems that persists in the higher education system in South Africa.



2.4 Problems in higher education in South Africa

The purpose of the massification of education is to increase the societal wellbeing, economic empowerment, and participation of a previously marginalised citizenry (McGregor, 2014). With the increasing demand for education services worldwide, more and more young people are accessing higher education, however, enrolment in Africa is estimated to still only be 20% of young people that are eligible to enter higher education due to financial constraints (Altbach & Knight, 2007). Since the introduction of the National Student Financial Aid Scheme (NSFAS) in South Africa in 1999, more students now have the means to enrol in higher education institutions (Strydom, Mentz, & Kuh, 2010).

Massification of higher education in developing countries, such as South Africa, is deemed necessary as it redresses a backlog of racial/ethnic inequality. However, the access to higher education must be increased while funding models must be revised in order to accommodate students (McGregor, 2014). South Africa has seen

a 60% (from 590,000 to 938,000) increase in the number of students entering the higher education sector to pursue a qualification from the years 1996 to 2011 (McGregor, 2014).

However, the massification of higher education has not been without some problems. The higher education system in South Africa has reported in the past that high dropout rates and low throughput rates of students are impacting on their ability to produce quality graduates (Mohamedbhai, 2014; Council on Higher Education, 2013). Many students at traditional universities are not completing their degree within the minimum timeframe of three years. The throughput rates from higher education institutions in South Africa are very low when compared to those of developed countries (Mohamedbhai, 2014; Strydom et al., 2010). However, for South Africa to grow the economy, it is important for the higher education institutions to produce quality graduates with appropriate skills.

The massification of teaching at universities has in part contributed to the low throughput rate at the university (Tom, 2011). Prosser and Trigwell (2013) state that the quality of education is affected by reduced student-lecturer interaction due to large classes and the poor academic literacy of students including language ability, problem solving, comprehension and presentation skills (Weideman, 2003). Most of the students at the university used in this study are from rural areas, where the quality of education and access to technology is very limited. Additionally, English is not the student's first language. The next section will discuss the traditional method of course delivery in higher education that is contributing to the problems discussed in this section.

2.5 Traditional course delivery in higher education

Higher education institutions often make use of a lecture-based approach to disseminate information to students. This approach is categorised by rote memorization of knowledge and fact that promotes surface learning and a teacher-centred paradigm (Betihavas, Bridgman, Kornhaber, & Cross, 2016; Roehl, Reddy, & Shannon, 2013; Berrett, 2012).

Many universities in South Africa still make use of the transmittal model of teaching where students are treated as empty vessels that passively absorbing information

(Betihavas, Bridgman, Kornhaber, & Cross, 2016). Price (2012) has stated that the unintended side effects of current teaching practices are that students are no longer expected to take responsibility for their own learning as they are not actively engaged in processing information or translating knowledge into practice. Instead of using the lecturer as a coach or mentor to stimulate and challenge their thinking or guide them through problem solving to encourage the application of the material, students passively absorb information during lectures (Bergman & Sams, 2012).

Predictably, literature has found that passive student audiences do not promote higher order learning (Bishop & Verleger, 2013). Statistics shows that students' attention declines after the first 10 minutes in class while the average attention span is only 15 to 20 minutes (McLaughlin, Roth, Glatt, Gharkholonarehe, Davidson, Griffen, Esserman & Mumper, 2014). Typically, the student will only retain 20% of material presented during the class.

Students have also shown less interest in lecture-style distribution of course information (Roehl, Reddy & Shannon, 2013). An opportunity to engage millennial students through active learning strategies.  Students that were born between 1982 and 2002 are called millennial students or digital natives (Wilson & Gerber, 2008). These students have been exposed to information technology from a very young age and cannot remember a time that access to information or technology was not available. These students are connected 24/7 and has learned to "think and process information fundamentally differently from their predecessors" (Prensky, 2001, p. 1). The students also enjoy the social aspects of learning such as group activities. However, while some educators have pointed out that the millennial student's ability to focus has decreased, others argue that it is simply their tolerance and needs that have changed and that active learning strategies is necessary to satisfy these students (Prensky, 2010). Technology can be used to enable alternative teaching methods that support active and deep learning strategies. Lecturers that make use of these innovative technologies in their teaching strategies move towards a learner-centred paradigm that allows the student to take control of their own learning in terms of the pace of study, mastery of content, and responsibility for coming to class prepared (Alvarez 2011; Fulton 2012). The next section will discuss online teaching methods.

2.6 Online teaching methods

Technology has made it possible to make teaching resources and content available outside the classroom. While e-learning in general is convenient and cost effective, there are a variety of different methods that can be used to accomplish this task. This section will discuss what e-learning entails and some of the methods that can be used to incorporate technology inside and outside the classroom.

2.6.1 E-learning

E-learning is defined as 'learning utilizing electronic technologies to access educational curriculum outside of a traditional classroom' (Elearningnc, 2017, p. 1). There are many differences between online courses and the traditional face-to-face courses that is currently the norm in most higher education institutions. When technology is used to teach, the lecturer's role is more to coach or mentor the students rather than to lecture. Students are also more actively involved with the development of knowledge as they interact with each other and the content resources. It also becomes harder for the student to hide among the masses in the classroom. The bottom-up development of knowledge means that the student is required to do more thinking, writing, doing, sharing, reflecting and peer reviewing. Typically, in the online environment students are more motivated to contribute as their input can easily be noted by all the students and the lecturer. Learning can be asynchronously, meaning the student can access the course content at their own time which means that learning becomes flexible and convenient for the student. Assessment is continuous and varied e.g. quizzes, discussion posts, reflections or case studies. Typically, the content can be accessed on a variety of devices such as smartphones, iPods, USB drives and other hand held devices (Bergman & Sams, 2012; Berrett, 2012; Fulton, 2012).

The problem is that the development of the online classroom has not received much attention when training or resources is considered. Very often it is expected that lecturers will make use of existing resources from the technology and teaching centres already available on campus to learn how to use these online tools. The expectation is that there is very little difference between the face-to-face and online classroom environment, which leads to confusion and anxiety among lecturers that

have never used technology before in their classrooms, let alone the teaching of an entire course with technology. Common problems reported by lecturers that use technology in their classroom are how to structure teaching and learning and the purpose of learning and resources available (Boettcher & Conrad, 2010).

There are various types of courses that can be delivered, making use of technology. The type of course is typically categorised, making use of the proportion of content that is delivered online. Table 1 provides an overview of the type of courses available to the lecturer in higher education.

Table 1: Types of courses (Allen & Seaman, 2008)

Proportion of content delivered online	Type of course	Typical description
None	Traditional face-to-face	Course with no online technology used
1-29%	Web facilitated  University of Fort Hare <i>Together in Excellence</i>	Course that uses web-based technology to facilitate what is essentially a face-to-face course e.g. learner management system to post the syllabus and assignments
30-79%	Blended/Hybrid	Course that blends online and face-to-face delivery. Makes use of a mix of online delivered content and classroom activities
80-100%	Online	A course where most or all of the content is delivered online.

There are also many tools available to teach online. Some of the lecturers may be familiar with technology in their personal lives, but many are new and will require the lecturer to learn how to use them. Often the number of tools are overwhelming and discourages the lecturer from using them (Boettcher & Conrad, 2010). Table 2 provides an overview of these tools.

Table 2: Tools to enable an online course environment (Boettcher & Conrad, 2010)

Tools and Applications	Description of pedagogical use and purpose
E-mail, announcements and discussion forums	Basic and essential communication tools
Audio and video lectures and resources	Creating a media-rich environment
Audacity audio software	Creating announcements, short mini-lectures or concept introductions
Blogs	Capturing students' thinking as they learn and provide a place for other students to comment on these thoughts
Wikis	Supporting student collaboration and teamwork on projects
YouTube	Posting videos, early concept introductions or process demonstrations
Course management system	Providing a virtual place to gather, meet, learn and practice
Text messaging, instant messaging and Twitter	Nearly synchronous tools that enable communication among students and lecturers
TurtlIn software	Software for detecting plagiarism
Social networking sites e.g. Facebook, LinkedIn	Internet sites for social networking and extended community

Quizzes	Timed, open-book quizzes
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These tools can be used in a variety of ways to enhance teaching. At present, much of the educational software that is used focuses on content delivery and do not allow the individual to customize the instruction (Boettcher & Conrad, 2010). The software supplements the work of the lecturer and is not integrated directly into classroom instruction. Typical examples include drill and practice programs for maths or typing (Davies, Dean & Ball, 2013, Woolf, 2010).

Differentiation of instruction methods enables the lecturer to meet the learning need of individual students which is nearly impossible in a large class (Woolf, 2010). Technology-enabled assessments can obtain diagnostic and formative information about students while course content that is delivered through technology provides the student with the flexibility on the pace and content being presented (Keefe, 2007). Once feedback is received from the assessments, the student can direct their own learning efforts (Davies, Dean & Ball, 2013). However, this is not possible with many learning management systems that is used for administrative and assessment purposes and not to customise the learning experience of the student. Ntlabathi, Makhetha and Cilliers (2017) found that the learner management system at the University of Fort Hare was mainly used for evaluation purposes, course management and to communicate with students. Collaboration among students and with the lecturer with the least used function of the learner management system. The next section will discuss the model that can be used by lecturers to design and implement e-learning activities.

2.6.2 Five stage model for e-learning activities

Salmon (2004) has developed a five-stage model, which provides a framework or scaffold for the structured implementation of e-learning activities (see figure 2). The model can assist the lecturer with the prior design of the course while providing a familiar and sequenced routine leading to increased control by the lecturer during the implementation phase. Phase 1 provide individual access to the student and provide them with a purposeful reason to visit the e-learning site frequently and repeatedly. During phase 2 the student establishes their online identity and finds peers with whom to interact. It is also during this phase that the students start to understand

the benefits and requirements of working with others in the online environment. Phase 3 introduces mutual exchange of information that is learning related. The student does not only communicate with their peers or lecturer, but the online activity facilitates the completion of tasks and supports the use of learning material. At Phase 4, course-related group discussions and activities develop to support collaborative and team-orientated knowledge construction. The last phase, Phase 5, provides the confident student with the ability to fully exploit their online learning making use of resources outside the e-learning platform and using the platform for assessment purposes.

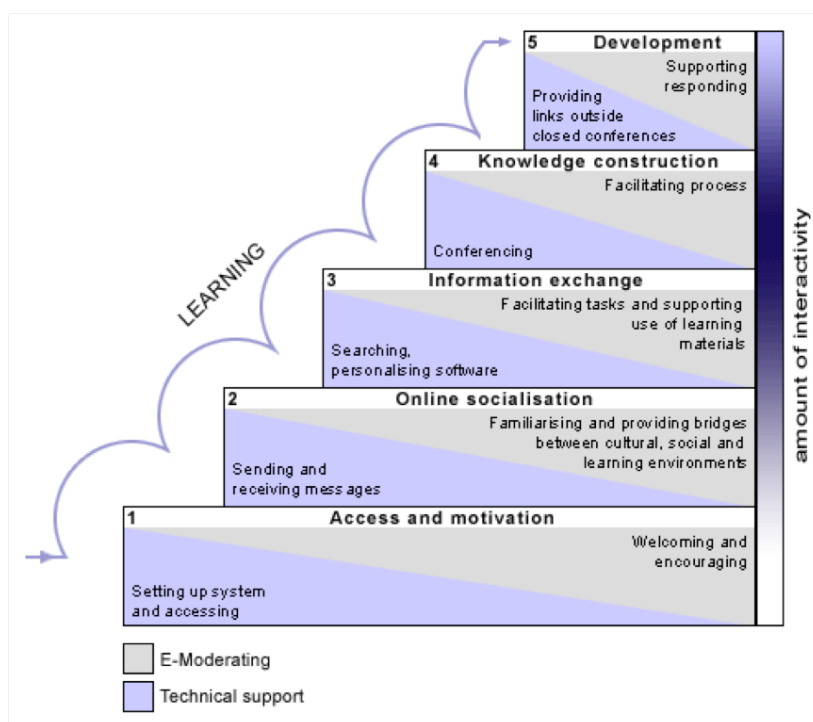


Figure 2: E-learning model (Salmon, 2004)

2.6.3 Blended learning

'Blended learning is when face-to-face learning and teaching experiences are combined with online tasks and activities' (Graham, 2006; p. 2). Garrison and Vaughan (2008) argued more than a decade ago that blended learning has the potential to transform higher education institutions. Blended learning has become more popular recently as the integration of ICT into the classroom has enabled the distribution of course content economically while providing for a student-centred learning process (Garrison & Vaughan, 2008; Graham, Woodfield, & Harrison,

2013). The blended learning environment thus combines the use of asynchronous Internet technology with face-to-face learning (Garrison & Kanuka, 2004).

There is as of yet no agreed upon single definition of blended learning in the literature. The following definitions had been put forward for blended learning:

'BL refers to a learning program using more than one delivery model to increase students' academic achievement and reduce costs' (Singh and Reed, 2001, p. 1).

'BL is a combination of technology and classroom instruction in a flexible approach to learning that recognises the benefits of delivering some training and assessment online but also uses other modes to make up a complete training programme which can increase learning outcomes and/or save costs' (Bañados, 2006, p. 534).



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'BL is about the thoughtful integration of face-to-face and online learning; the redesigning of a course to increase student engagement; and the restructuring and replacement of traditional class hours' (Garrison and Vaughan, 2008, p. 7).

All of these definitions do recognise that blended learning is a combination of face-to-face and online delivery methods of content and that the ultimate goal of the teaching method is to increase students' learning methods and reduce the cost of higher education (Kurt, 2017). Furthermore, literature has found that blended learning has several advantages which include increased learning outcomes (Bonk & Graham, 2006; Vaughan, 2010), increased pedagogy (Graham, 2006), increased learner motivation and satisfaction (Fulkerth, 2010), increased interactions (Bonk & Graham, 2006), and reduced costs (Bonk & Graham, 2006; Graham, 2006).

According to Staker and Horn (2012) there are various models of blended learning that can be distinguished in the literature: the rotation model, flex model, self-blended and enriched virtual models. In the rotation model students attend a physical class but rotate through different activities which can include individual/group activity, individual tutoring, and pencil-and-paper assignments. For this model to be considered blended learning at least one of these activities must be offered online. Chen, Wang, Kinshuk and Chen (2014) argues that the flipped classroom is a form of rotation model where students learn online at their own pace and do exercises in the physical classroom. In the flex model the student can access the content and instruction online, but there are instructors on-site to provide help when the student requires it. The self-blended model allows student to take supplementary course online at school or at home. The enrich virtual model allows the university to operate almost entirely online and students only meet the lecturer face-to-face during the initial course meeting. The next section will focus specifically on the flipped classroom as a form of blended learning.

2.6.4 Flipped classroom



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The principles of a flipped classroom are not new in the faculties of Social Sciences, Law and Health. Lecturers often expect students to prepare prior to class time and then discuss the work during class time. Students reading a novel or law case before class and then using class time to explore the text would be an example of informal 'flipping the classroom'. However, the flipped classroom has only been adopted in isolated fields of Biology, Engineering, Physics, Statistics, Mathematics and Computer Science (Talbert, 2014; Berrett, 2012; Bergman & Sams, 2012).

The modern origin of the flipped classroom is officially attributed to two high school teachers, Jonathan Bergmann and Aaron Sams, who started to record their live teaching sessions and posting it online for their students to watch in 2006. The videos were initially used as a method for students that missed their chemistry class to catch up. The popularity of the videos soon became evident as other schools started making use of the videos as plans for substitute teachers, to learn chemistry content themselves or revision for examinations (Bergman & Sams, 2012).

The idea of the flipped classroom was built on a very simple assumption. Sams observed that students need the teacher's attention when they are stuck at home with the prescribed homework for the class. He believed that students could receive content on their own and started to prescribe the course content as homework. The students watched the videos that the two teachers recorded and then conducted experiments and more complex problems in class. The early benefits from this approach seemed that it was more efficient and effective than the traditional approach (Bergman & Sams, 2012).

Flipping the classroom means that the traditional classroom is now inverted. Students are expected to actively gather information outside of the class time by reading, watching recorded lectures or listening to podcasts. During classroom time, the student is then expected to apply the knowledge they have gathered to problem solve activities in groups through peer instruction. The lecturer becomes a facilitator in this environment and can correct the misconceptions of students immediately. This type of learning is active in nature and more student-centred than the traditional lecture system (Berrett, 2012; Bergman & Sams, 2012).



The flipped classroom allows the lecturer to completely restructure the classroom time. Table 3 provide a comparison between the traditional and flipped classroom approach to in relation to teaching time.

Table 3: Comparison of class time in traditional versus flipped classroom (Bergman & Sams, 2012)

Traditional classroom		Flipped classroom	
Activity	Time	Activity	Time
Warm-up activity	5 min	Warm-up activity	5 min
Go over previous night's homework	20 min	Q&A time on video	10 min
Lecture new content	30-45 min	Guided and independent practice and/or lab activity	75 min
Guided and independent practice and/or lab activity	20-35 min		



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2.6.4.1 Pedagogy of the flipped classroom

'Flipped learning is a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting groups space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter" (Bergman & Sams, 2012b, p. 6).

Pedagogy is a sustained process whereby the student acquires new forms or develops existing forms of conduct, knowledge, practice and criteria from someone or something deemed to be an appropriate provider and evaluator (Butt, 2014). This definition identifies three elements of teaching and learning that must be considered in the online environment. Firstly, the needs of the student must be met through technology. This applies to the global student that is making use of online courses to access their material, or the student in the classroom that is being taught problem solving skills making use of real world examples. While the needs of the students can be the same, the method of teaching must be appropriate for their environment.

The second element is that someone, such as the lecturer, must appropriately guide or direct the learner. This puts the onus on the lecturer to educate themselves and understand the purpose of the technology that they are using in the classroom. The third element speaks to the acquisition of conduct, knowledge or practice by the learner meaning that technology should be used with a purpose in the classroom and not just because it is available or convenient (Boettcher & Conrad, 2010).

There are a few main theories of learning that must be considered by lecturers when considering an online classroom in the Higher Education environment. These theories include the Behaviourist theory, Cognitivist Theory, Constructivist Theory, Social Learning Theory, Humanist Theory, Multiple Intelligence Theory and Problem-based Learning. While each theory is important in its own right, it is beneficial to the lecturer to take note of all of these theories as it will provide a wealth of information about how to accommodate the needs of self-directed, experiential and lifelong learners. Table 4 provides an overview of the first 5 theories that will be discussed, of which constructivism will be discussed in more detail in the next section as it relates to the flipped classroom.



Table 4: Overview of learning theories (Ashworth, Brennan, Egan, Hamilton, & Saenz, 2008)

Aspect	Behaviourist	Cognitivist		Humanist	Social learning	Constructivist
View of the learning process	Change in behavior	Internal mental processes (including insight, information processing, memory)		A personal act to fulfil potential	Interaction with and observation of others in a social context	Construction of meaning from experience
Locus of learning	Stimuli in external environment	Internal cognitive structuring		Affective and cognitive needs	Interaction of persons, behavior and environment	Internal construction of reality by individual
Purpose of education	Produce behavioural change in desired direction	Develop capacity and skills to learn better		Become self-actualized autonomous	Model new roles and behavior	Construct knowledge

2.6.4.2 *Constructivist Theory and Activity Theory*

'Constructivism is based on the primary tenet that individuals use personal experience to construct and understand knowledge and reflection to create meaning' (Hawks, 2014, p. 264). This means that constructivism provides for the students to actively 'construct their own knowledge' (King, 1993). This means that students are active participants in the learning process as they are encouraged to seek the meaning in their experiences (subjective), which then becomes part of their knowledge. Students can learn in a social environment with their peers. This exposes them to different viewpoints and styles of learning. Although each student's subjective experience will be different, each is considered just as valid as the rest. Therefore, there are no objective criteria for what constitutes knowledge (Boghossian, 2006). In general, constructivism makes use of shorter and more frequent assessments to assess progressive increases in knowledge. The term 'just in time' learning is useful in this context. The lecturer asks the students to answer a short quiz online just before the class and uses the results to direct what content they will include in the class (Boettcher & Conrad, 2010).

Strayer (2012) states that the flipped classroom is grounded in the constructivist theory of learning as it is a student-centred model. In constructivism the lecturer is no longer the center of knowledge, but is replaced with the students' learning experience. The online classroom fits well with this school of thought as it does provide the student with the means to construct their own knowledge based on the course material and interaction with peers and the lecturer (Kurt, 2017). Table 5 discusses the difference between teacher-centred, student-centred and learning-centred approaches.

In order to provide students with the opportunity to learn, as many as possible opportunities must be created, as students will learn in different ways (see Table 5). This approach speaks to Vygotsky's Theory of Social Development that stresses the fundamental role of social interaction in the development of cognition. The Zone of Proximal Development illustrates the difference of what the student can learn on their own, and what they can learn with the guidance and encouragement of a knowledgeable person. The skills they learn during this process they will apply in future when faced with a similar task (McLeod, 2007).

Table 5: Centred learning from different perspectives (Jahangiri & Mucchiolo, 2013)

Perspective	Process	Practice
Teacher-centred	Instructor-led action, prepared in advance and delivered didactically, where information is “ pushed ” to the student	Lectures, information, outlines, experiences, opinions, stories, analogies, examples
Student-centred	Group-directed behaviour based on problem solving to stimulate thinking, as information is “ pulled ” from the student	Interaction, participation, discussion, role-playing, debate, question-answer, audience response system, online learning
Learning-centred	Task-orientated or activity-based exercises that increase social networking and collaborative skills, where information is “ shared ” among learners	Individual or group assignments, tasks, projects, labs, group presentations, team-driven competitions, games, debates

The Activity Theory, is appropriate and relevant to this study as it explores students’ perceived experiences on flipped classrooms at a traditional South African university in comparison to traditional classrooms. The first activity would be transforming the traditional classroom into a flipped classroom. In this activity, the first lesson, i.e. the object (purpose) is to practice the efficient and effective use technology. Once this is mastered, a new activity begins, namely, learning to how to use technology to shift educational activities to online settings. Eventually, the effective use of technology would no longer be viewed as an activity in itself, but an action as part of another activity, e.g. to ensure active and collaborative learning.

As part of the Activity Theory, the tools in this study relate to: learning strategies adopted by students, language and communication used in the lecture room, assignments and ICT tools (computers). Based on this theory, computer-supported collaborative learning is key to promote student interaction and collaborative group activities, which encourage students to ask questions, explaining and justifying opinions and reasoning are key to promote student interaction.

In this theory the community of a traditional South African university refer to students and lecturers where lectures are supposed to guide and support students while students are responsible for construction of their own knowledge. For the above to be realized, division of labour which refers to certain components or elements to be in place or put in place for the tool, subject, community, and rules to function effectively. The relationship between the subject (human doer) and the object (the thing to be done) forms the core of an activity. Thus, Information and Communication Technology system tools can be effectively used by lecturers and students as a way of shaping activities in different ways in flipped classrooms. However, various techniques of communication, collaboration, interaction between students to lecturers, lecturers to students, and student to student are essential for the realization of outcomes. This theory stresses the importance of collective efforts by different actors (students and lecturers). Although different actors (lecturers and students) follow different rules and employ different activities and methods in order to achieve set outcomes, the Activity Theory provides a rich and holistic understanding of how people are able to do things together with the assistance of sophisticated tools (technology) in complex environments where socially-constructed, collective knowledge is the predominant source of learning, creativity and innovation.

2.6.4.3 Characteristics of the flipped classroom
Bergman and Sams, (2012b) state that there are 3 characteristics of the flipped classroom that must be considered within the Zone of proximal development. These three characteristics are content of the course, curiosity of students and relationships that exist in the classroom and will be discussed in more detail below.

2.6.4.3.1 Content of course

Bloom's taxonomy is a useful framework to explain teaching and learning. Lecturers often use Bloom's taxonomy to guide their own teaching practices. In order to facilitate learning, the lecturer will start with activities that focus on Remembering and Understanding. They then move up the pyramid in order to reach the higher order activities of analysing, evaluating and creation.

In the traditional classroom, most time is spent on the bottom two activities, with little time allocated for anything beyond the level of application. Students are then given homework that requires them to apply these higher order activities without the guidance of their lecturer or peers. The flipped classroom reverses this order as the bottom two layers, remembering and understanding, is done before class. This allows lecturers to spend their valuable class time with students as they acquire the

skills in the upper levels of Bloom's taxonomy. This allows for a deeper learning experience as students have a more comprehensive and thorough understanding of the content (Bergman & Sams, 2012b; Brame, 2013).

One of the concerns that lectures have is that students will watch the videos but not learn from them. In order to solve this problem, Kitch (2016), developed the WSQ tool (Watch-Summarise-Question). Students watch the video and take guided notes. After this section is completed, the student must summarize what they have learned. This helps them to retain what they have learned, but also increase their academic writing skills. Where the subject matter is still new, guided questions can be used to help the student to identify the most important points. After the summary, the students must write down what they did not understand in the video or ask a higher level question about the concept that can be used for a group discussion.

2.6.4.3.2 Curiosity of students

According to Andreou, Papastavrou and Merkouris (2014) states that the Felder and Soloman's classification of 8 different learning styles can be used to classify how students are able to learn:



- Active Learners: retain information by engaging in problem-solving activities in class.
- Reflective Learners: prefer to reflect on the information in their own time when watching the videos at their own pace.
- Sensing Learners: need specific examples to understand a connection between concepts and the real world which can be guided in class.
- Intuitive Learners: prefer to discover connections between concepts themselves during group work in class.
- Visual Learners: prefer to learn through pictures, diagrams, flow charts or demonstrations which can all be included in the video.
- Verbal Learners: prefer the use of written or spoken explanations from textbooks or other online resources.
- Sequential Learners: prefer content which follows a logical and linear series of steps e.g. content via video, then applying the content in higher order activities.
- Global Learners: assimilate large portions of information before making a connection between aspects of this information in class or working with peers.

Teaching methods promoting active learning are those "instructional activities involving students in doing things and thinking about what they are doing" (Roehl, Reddy, & Shannon, 2013, p. 2). The lecturer is responsible to choose appropriate instructional activities for use in active learning. These activities can include individual activities, paired activities, informal small groups and cooperative students' projects (Zayapragassarazan & Kumar, 2012). While a variety of tools are available to accomplish these activities, the most important aspect is that the students must utilise higher-order thinking skills as discussed in the Bloom's Taxonomy (Prensky, 2010; Roehl, Reddy, & Shannon, 2013).

The flipped classroom provides an opportunity for most types of students to foster curiosity about subjects and increase deep learning. These different types of activities allow for different learning styles and specifically the millennial learner who thrives in an environment of variety and change. Students can learn at their own pace and with different resources before the instruction of the lecturer in applying concepts. Students are also encouraged to explore their interests, work on projects and engage in inquiry (Roehl, Reddy, & Shannon, 2013; McLaughlin et al, 2014).

2.6.4.3.3 Relationships in the classroom

The flipped classroom has already been established as a student-centred approach to learning. Each student must prepare before class so that they can participate and engage in the class discussion. If the student is not prepared, their peers will not benefit from their input and this serves as a mechanism to assess student preparedness (McLaughlin et al, 2014; Davies, Dean, & Ball, 2013). One of the most characteristics of the flipped classroom is that it allows the student to build relationships with their peers and lecturers in order to use the zone of proximal development to increase their learning experience.

2.6.4.4 How to develop a flipped classroom

There are 10 core learning principles that must be considered when designing an online course and planning the delivery of the course. The first principle refers to the four elements that a structured learning experience must consider. The elements include that the online classroom provides for an active, student-centred learning

process; the role of the lecturer becomes one of directing, supporting and assessing the learner; the specific content knowledge and skills that the students need to develop and the environment in which the learning takes place. There is no one model for the flipped classroom, instead the lecturer can adapt flipped learning to their style, methods and circumstances. This allows the lecturer to play to their individual strengths (Bergman & Sams, 2012b). The second principle acknowledges the unique knowledge, skills, experience and attitudes of the learner. Online learning is well placed to design learning experiences from the general expectations of the learner's zone of proximal development and peers as well as the lecturer are available to move the student along. The lecturer must also understand that their content is not the only way in which the students' can learn. Students will use Google to search for additional content or refer to the textbook for more examples of the work (Berrett, 2012). The third principle acknowledges the lecturer as the director of the learning experience as they design and structure the course experience, direct and support learners and assess the learner outcomes. The lecturer can draw from many different types of student-centred learning including differentiated instruction, problem/project-based learning and inquiry-based study to practically implement this type of learning (Bergman & Sams, 2012b; Davies, Dean, & Ball, 2013). Principle 4 states that 'all learners do not need to learn all course content, but all learners do need to learn the core concepts' (Boettcher & Conrad, 2010, p. 26). The course content is no longer prescribed by a single textbook, but any resource that is available on the Internet. It is the task of the lecturer to mentor students adequately to find these resources whom in turn will naturally gravitate to the content resources and experiences that match their zones of personal proximal development. The lecturer is then responsible for providing a rich database of content and experiences to the learners. While lecturers have complained that it is difficult to find appropriate videos, the amount of resources that are available on the Internet subsequently has increased. Traditional textbooks now being supplemented with internet resources, videos, and simulations (Alvarez 2011; Berrett, 2012, Khan 2012). Khan Academy has become a popular open educational video resource website that provides videos on a variety of subjects (Davies, Dean, & Ball, 2013). Similarly, Massachusetts Institute of Technology's started MITx and Stanford University uses Udacity to provide videos. Berrett (2012) states the fifth principle refers to the environment in which the learning experience takes place. The technology used should be

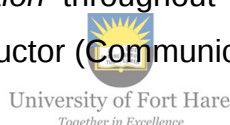
convenient, allow the student to interact with their peers and access course content (Boettcher & Conrad, 2010). The most popular method of distributing course content prior to the class remains a video. Lecturers can either produce their own videos or search the Internet for video resources already available in their course subject. The latter may be more appropriate for lecturers starting out with the flipped classroom or those who do not have the time or resources available to produce their own videos. The sixth principle refers to Vygotsky's Zone of proximal development and states that every learner has a space that is ready to develop into useful knowledge. It is the lecturer's responsibility to provide problems and concepts that challenges them beyond their current level of development. The seventh principle states that concepts cannot be learned as individual words, but must be organised and interconnected knowledge clusters. Students often learn the terminology of a new field of study without understanding the underlying concepts within which these words fit. Online courses are able to provide tools such as blogs, wikis, journals and discussion forums, to facilitate the clarification of these concepts among the students. Literature has found that students have a positive attitude towards instructional video podcasts (Bolliger, Supanakorn, & Boggs, 2010; Fernandez, Simo & Sallan, 2009; Holbrook & Dupont, 2010;). Student performance was also found to be increased when using videos as instructional method (Alpay & Gulati, 2010; Vajoczki, Watt, Marquis, & Holshausen, 2010). The eighth principle identify that different instruction is required for different learning outcomes. This means that the lecturer must design the course with different instruction methods in mind and tailor these to the specific learning outcome that must be achieved. Principle 9 refers to the task-on-time principle which states that more time on a task equals more learning as it allows learners to make the knowledge their own and creat linkages within their own data knowledge structures. The last principle states that learning occurs within a contex which is influenced by the environment. If there are barriers that hinder the availability of technology, e.g. lack of electricity supply, high cost or Internet access, then an online course may not be a feasible option for higher education. Only once the barriers have been addressed, then the course be rolled out succesfully. Some of the general principles of the flipped classroom inlcude the creation of collaborative spaces that emphasises learning, not teaching activities. This is often a problem as the traditional classroom was built as a lecture or theatre hall. While the flipped classroom is inherently student-centred and collaborative in nature, there should be



individual spaces where students can work with fewer distractions. Students can make use of noise-cancelling headphones if it is not possible to move desks around (Bergman & Sams, 2012b).

In summary, Talbert (2014) and Hawks (2014) put forth the following four principles that must be present in an effective flipped classroom:

- *Highly structured pre-class assignments* which are geared towards introducing the students to the new theoretical concepts making use of technology (teaching strategies and technical assistance);
- *Means of accountability* to ensure that students complete the required pre-class assignments and out-of-class work. Question and answer sessions or in class quizzes are useful at the beginning of the class for the lecturer to assess the individual student knowledge gaps (learning strategies);
- *Well-designed sense-making activities* for the students to engage in during lecture time (teaching strategies); and
- *Open-lines of communication* throughout the course so that students can interact freely with the instructor (Communication with peers and lecturer).



2.6.4.5 *Advantages of the flipped classroom*

There are many advantages to the flipped classroom that lecturers can use in higher education to promote their teaching and learning activities. Flipping the classroom helps busy students as they can follow the course content at their own pace. Students that cannot attend the class can catch up at home by watching the videos to learn the course content. During class time the lecturer has more time to help struggling students as they can interact with the class and attend to problems as they arise. Students that are struggling with course content can also watch the videos as many times as they need to, which allows them to learn the material at their own pace. This flexible learning method means that the lecturer can personalise or differentiate the learning outcomes for individual students according to their level of understanding in the subject. For those students that understand a particular subject, more difficult problems can be prescribed, while struggling students can be given more foundational exercises to reinforce the concept before moving on to more difficult work (Bergman & Sams, 2012; Roehl, Reddy & Shannon, 2013; Herreid & Schiller, 2013).

The flipped classroom also allows the teacher to interact more with their students before and during class. This means that the lecturer has the opportunity to build a relationship with their students as they interact with them during the class on a more personal level. The role of the lecturer also changes from presenter of content to learning coach or facilitator as the time in class is spent answering question, working in small groups or guiding the learning of the student individually. The method of classwork increases the interaction between students which means they do not rely on the lecturer for the sole disseminator of knowledge anymore (Roehl, Reddy & Shannon, 2013; Herreid & Schiller, 2013).

Self evaluations are the most common way to determine the perceptions of students of the flipped classroom. The results in literature has indicated that the flipped classroom has been perceived as having a positive impact on student learning (Herreid & Schiller, 2013). Driscoll (2010) conducted a study with 228 students in 8 schooling districts about their experiences with the flipped classroom. He found that 77% and 79% of the students reported a more frequent and positive interaction with the teacher and their peers during class respectively; 80% of the students reported a greater access to course material while 66% of students were more likely to engage with collaborative decision making with their peers. A large part of the students (70%) also reported that they were more likely to engage in critical thinking and problem solving (higher order Bloom's taxonomy activities) than before.

One of the criticisms of the current research in this field is that there is very little evidence available about the objective increasement of the flipped classroom (Fautch, 2015; Galway, Corbett, Tabora & Frank, 2014). In 2012, Ruddick described a course redesign project for a college preparatory chemistry course. The results showed that the students who participated in the flipped classroom outperformed the standard lecture-based students, with higher final examination scores and overall success in the class. Additionally, the students reported that they became more interested in and felt less intimidated by the course. Similarly, Berrett (2012) reports that students that were enrolled for a calculus flipped class showed twice the rate of gains than their peers that were enrolled in traditional lectures. However, both Marlowe (2012) and Zheng et al (2014) found that the flipped classroom enhances the students' cognitive thinking, but not their academic performance.

One of the unintended consequences of the flipped classroom is that the content can now reach a wider audience. Bergman and Sams (2012) reported that her reading programme for first time English speaking kindergarten learners was used at home by the extended family to also learn English. Bergman reported the same results as their videos were used by many high schools in the USA to supplement their own curriculum. This opens up exciting new possibilities for collaboration and distribution of expertise to rural or under resourced schools that do not have the same facilities but can now expose their students to these experiments.

2.6.4.6 Disadvantages of the flipped classroom

One of the main disadvantages of the flipped classroom is that many lecturers are not prepared or able to incorporate the principles of the strategy into their teaching strategy. Bergman and Sams warn that the flipped classroom must not be seen as a new 'gimmick', but that the pedagogy should always drive the technology.

Lecturers complain that initially, their workload had increased as the time to prepare for the new method of content delivery. McLaughlin et al. (2014) estimated that lecturers required 127% more preparatory time, but this would decrease in the future due to resources being reused. In addition, lecturers need to be familiar with their course content as they need to be able to evaluate what is appropriate for their class (Herreid & Schiller, 2013). Lecturers that choose to prepare videos for their classes also find that the initial preparation can be cumbersome. It also becomes more difficult to make adjustments to course content as the video needs to be re-recorded. As technology becomes cheaper, smarter, faster and better, the lecturers will learn how to use these tools and build their own database of content (Prensky, 2010; Roehl, Reddy, & Shannon, 2013; Bates & Galloway, 2012; Zheng, Becker, & Ding, 2014).

Lecturers also need to be good at answering students' questions in class. Often students are still processing the information and their misconceptions are not yet clear, which makes it difficult for the lecturer to understand where the problem is (Berrett, 2012).

The student can also resist the use of technology in the classroom. Students are used to the traditional lecture model where they are expected to passively absorb

knowledge and recite it back at the appropriate time. The flipped classroom by nature expects the student to be active and prepare before the class, which is seen as an increased workload. While some students will adopt the approach once they experience the teaching strategy, others will never enjoy the teaching strategy especially if they do not enjoy working in groups (Berrett, 2012; Herreid & Schiller, 2012; Roehl, Reddy & Shannon, 2013; Chen, Wang, Kinshuk, Chen, 2014).

2.6.5 The flipped classroom in South Africa

Research in the flipped classroom has been increasing since Bergman and Sam introduced it in 2006. There is a wealth of articles and even some master and doctoral theses that were published since then (Glynn, 2013; Snowden, 2012; Zownorega, 2013).

As discussed in the previous section, the results are still not conclusive with some lecturers reported lower failure rates, greater flexibility, less stress, increased student attitudes and even better test scores for classes that adopted this model (Meyer, 2013; Flipped Learning Network, 2012).  In contrast, a 3-year study conducted at the Harvey Mudd College suggests that there is no difference in student outcomes when compared to traditional lecture classroom (Atteberry, 2013). A possible explanation for these results could be the multiple studies that has been conducted in isolation in various disciplines. The flipped classroom has been found to be very effective and increase academic performance in especially practice-based disciplines (McLaughlin et al., 2014; Wong et al., 2014; Sharma, Lau, Doherty & Harbutt, 2015)

One of the most important requirements of the flipped classroom is that technology, computers and software, is required to produce videos, must be available to both the lecturer and student. This means that there are financial implications for higher education institutions that want to make use of this approach. In developing countries electricity may also be a problem which will render the technology less useful. In South Africa bandwidth is also limited and data bundles are expensive (Roehl, Reddy & Shannon, 2013). The unique conditions of developing countries must be considered before the approach is chosen as a learning and teaching strategy.

In South Africa, the flipped classroom has been investigated in the higher education contexts. Tanner and Scott (2015) produced the first study in 2015 where she implemented the flipped classroom approach in an Information Systems course over 2 semesters. The study found 6 benefits of the flipped classroom approach as illustrated in Figure 3.

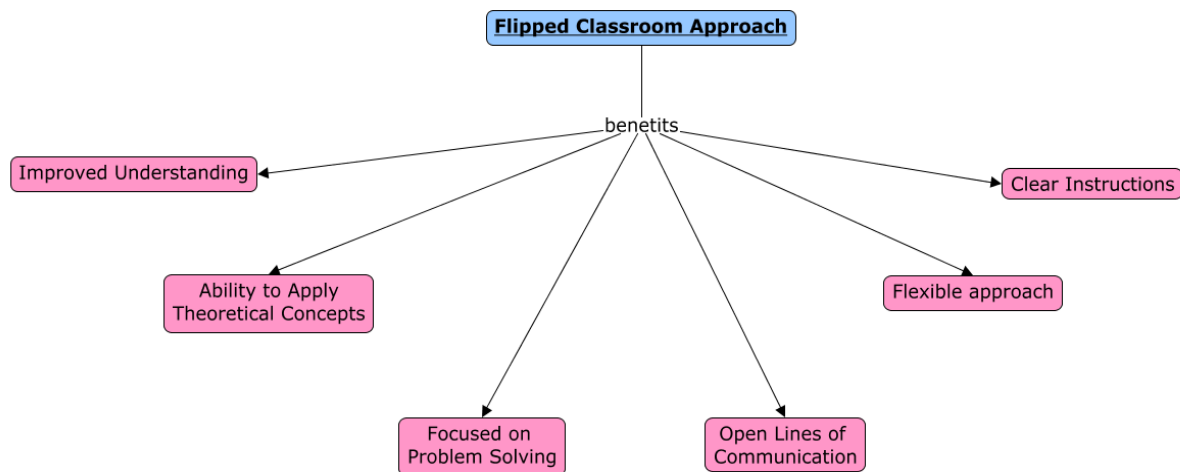


Figure 3: Benefits of the flipped classroom in a South African higher education context (Tanner & Scott, 2015)

Most students reported that they had increased understanding of the course work as they have to keep up to date with the content through pre-course activities to prepare with the quizzes. While the quizzes did not count toward the semester mark of the students, they did have to complete 80% of the quizzes to gain entry to the final exam. Some students did not respond to the external motivation and simply completed the quizzes without any regards to the correctness of the answers. Students did feel that the exercises in class helped them to understand the course content better and enjoyed the engagement with their peers and lecturers. They felt that the exercises, in combination with the discussions, were perceived to be more effective than traditional lectures and better contributed to learning (Tanner & Scott, 2015).

The study also found the two major limitations of the approach to be the lack of understanding of the prescribed content and the increased workload. Students also reported that the quizzes prior to the class were not available long enough ahead of

class or that they had limited internet access at home. Students also reported that they could 'hide' in the groups by simple agreeing with the majority (Tanner & Scott, 2015).

In more recent years a few more research studies has been published focusing on the flipped classroom in higher education. These studies are mostly limited to observations and reflections from the perspective of the lecturers in their attempts to implement a flipped classroom. Mulder and van Oordt (2015) conducted a pilot study in an undergraduate taxation class at the University of Pretoria. The students used a podcast as a revision tool, and later a lecture replacement tool, in a flipped classroom strategy. While three quarters of the students indicated that the podcasts were helpful as a revision tool, only half of the students indicated that they were satisfied with the flipped classroom learning strategy. The North-West University has adopted technology enhanced teaching and learning as part of their institutional philosophy. One of the factors that have been reported as an enabler in this process is the professional learning and development among the teaching staff (Heymans, 2014). Le Roux (2014) reported that the flipped classroom had positive results among students in a rural campus of the University of the Free State.



2.7 Conclusion

The chapter discussed how e-learning, and specifically blended learning, can be used to increase the learning environment of higher education in South Africa. The learning experience of millennial students must provide a varied learning experience with different tools, which should be employed making use of technology. A constructivist pedagogy provides an analytical lens to evaluate these e-learning activities and the way in which students learn by making use of this approach.

The flipped classroom is a form of blended learning and has become more popular and is being researched, although in silo's, in developed countries. The consensus seems to be that the flipped classroom promotes cognitive higher order functioning, but there is no clear result yet if academic performance of the students is increased. The studies do suggest that the flipped classroom is more appropriate for service subjects. In South Africa the flipped classroom is being implemented in individual cases and some research had been conducted in this regard.

Chapter 3: Research Design and Methodology

3.1 Introduction

“Research is a process of finding out about a phenomenon by critically looking at its significant attributes and behaviours. It, thus, encompasses the application of a systematic and objective investigation to provide answers to an identified problem” (Burnes & West, 2000, p. 59).

The methodology chapter of a dissertation provides the researcher with an opportunity to present and justify the research methods that were used to answer the research problem that was presented in the first chapter (Saunders, Lewis & Thornhill, 2009). If the researcher were to choose the wrong or inappropriate research methods, this would result in the failure of the research. To aid in this decision making process, Saunders et al. (2009) have identified six research stages represented as a ‘research onion’. The six stages include the philosophy, approaches, design, strategy, choices, time horizons and data collection techniques that the researcher can choose to complete their research. Figure 4 illustrates the different components of the research onion as it pertains to this study.

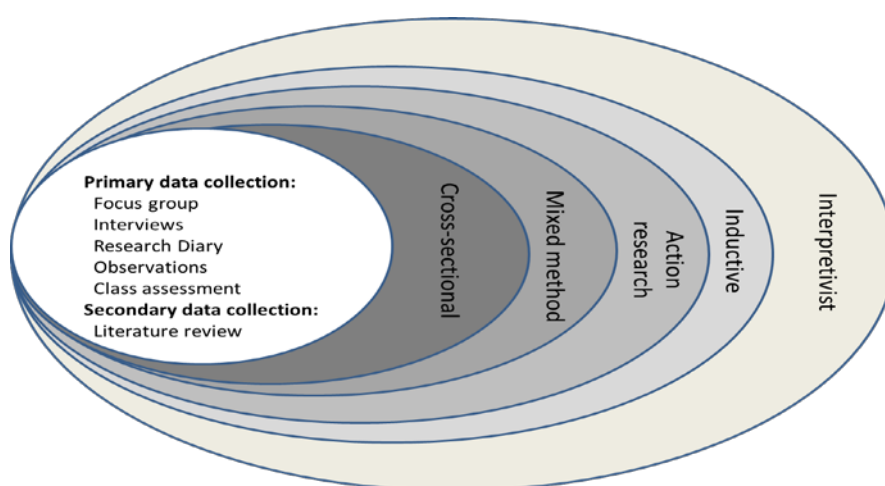


Figure 4: The research 'onion' (adapted from Saunders et al., 2009)

This chapter follows the 'research onion' approach. The chapter starts with an explanation of the various research paradigms or philosophies (positivism,

interpretivism and pragmatism). The research approach and design are discussed in the next sections followed by the study population and sampling techniques used in the study. This is followed by the data collection techniques (both primary and secondary data collection methods), the data analysis and how the trustworthiness, validity and reliability of the data were maintained. The chapter concludes with the ethical considerations for the study. The next section discusses the positioning of the study according to the main philosophical research paradigms.

3.2 Positioning of the study

Saunders et al., (2009) consider a research approach as a means to study social phenomena from which certain understandings can be achieved. However, Collis and Hussey (2013) urges the researcher not to simply choose a positivism or interpretivist approach for their research, but to rather interrogate the research question and choose the methods that will best be able to answer the particular question. They continue to argue that an approach that combines both paradigms will enable researchers to adopt a broader and often complementary view of the research problem.



Figure 5: Continuum of core ontological assumptions (Collis & Hussey, 2013)

As illustrated in Figure 5, the *Continuum of Core Ontological Assumptions* indicates that the study is aligned with the fifth stage of the Continuum: *Reality as a Social Construction*. The reason why this study is placed in this Continuum is that the study participants, in the case of this study students are in a continuous process of interpreting the social world around them and the action of others (peers and lecturers) with whom they interact. These interactions will lead to the study real events. Therefore, this study leans towards an interpretivist and positivist approach as the collected qualitative and quantitative data can be used inductively to

investigate the student's experience of the implementation of a flipped classroom. The next section discusses the research paradigms in which this study is located.

3.3 Research Paradigm

According to epistemology, all research must be built on a solid foundation of existing knowledge and theory in order to ensure that the study is sound and rigorous. This foundation will include a research paradigm that guides how the research is conducted (Collis & Hussey, 2013). In addition, the use of an accepted paradigm contributes to the credibility of the research (Olivier, 2009). Collis and Hussey (2013) introduce two main paradigms, which were identified in the previous section, that are available to the researcher: positivism and interpretivism. Recently a third paradigm, pragmatism, has also gained popularity. This section will provide a brief overview the paradigms available to the researcher and a justification as to why the pragmatist paradigm was deemed suitable for this study.

3.3.1 Positivism



This paradigm is considered to be the oldest research paradigm and is traditionally found in natural science studies (De Vos et al., 2005). The paradigm makes the following two assumptions: (1) the world is ordered and regular, (2) the world can be investigated objectively. This means that reality is concrete and unchanging and can be analysed through measurable attributes (Myers, 2009). A positivistic study produces results that can be generalised to other similar contexts.

One of the most important assumptions of this paradigm is that the world exists independently of humans. In fact, researchers in this field consider all people and objects to be alike. The assumption is then that both the physical and social worlds can be studied, captured and measured. This paradigm also does not seek to explore the social world of people, organisations and culture (Oates, 2006; Wahyuni, 2012). Furthermore, the researcher acts as an impartial observer and facts are discovered independently of the researcher's personal values and beliefs. Common methods to test the results are mathematical modelling and statistical analysis that provide a logical and objective means of analysing observations and results.

This study explores the students' experience of a flipped classroom in higher education. This teaching pedagogy was introduced in a traditional university, and therefore, the social nature of humans was included in the study. Thus, an appropriate paradigm for this study should also be subjective in nature in order to include the social context of the participants under. The interpretivist paradigm is discussed in the next section.

3.3.2 Interpretivism

Collis and Hussey (2013) states that the Interpretivist research paradigm rely upon the views and activities of participants as to how they understand and interpret their own reality. As such, interpretivism does not prove or disprove hypotheses, but seeks to identify, explore and explain how the factors in a social setting are related and interdependent in a specific context (Oates, 2006; Klein & Richey, 2007).

Interpretivistic research is more subjective in comparison to positivism and may be influenced by the researcher's beliefs, values and actions (Olivier, 2009). Interpretivists also maintain that, as the human perspectives and experiences studied are subjective, social reality may change and may have multiple perspectives (Wahyuni D. , 2012). As a result interpretivists reject both objectivism and a single universal truth as each person perceives the world in a different way. The objective of interpretivistic research is to provide a dynamic, socially constructed meaning from the participant's perspective, which is in contrast with the universal truth as is the case with positivism. In line with this objective, the assumptions, beliefs, values and actions of the researcher inevitably affect the research process. It is, thus, essential that researchers acknowledge their influence on the research process (Collis & Hussey, 2013; Oates, 2006). This type of research also has a strong preference towards qualitative data analysis.

As discussed in the previous section, very few researchers make use of a purely positivistic or interpretivistic stance in their research approach. Instead, Collis and Hussey (2009) advocate that the ontological, epistemological, axiological and methodological assumption of both paradigms must be considered in order to choose the most appropriate paradigm. These assumptions are summarised in table 6 below.

Table 6: Assumptions of Positivism and Interpretivism (Collis & Hussey, 2013)

Philosophical Assumption	Positivism	Interpretivism
Ontological assumption	A single reality, knowable, probabilistic	Multiple realities, socially constructed
Epistemological assumption	Objective, dispassionate, detached observer of truth	Subjective and include the values and knowledge of the researcher in the researcher process
Axiological assumption	Truth, universal and beautiful, predictions can be made	Understanding, situated and description of context provided
Methodological assumption	Observation, quantitative, statistical approach	Participation, qualitative, hermeneutical, dialectical approach

The next section discusses the relevance of pragmatism to this study.

3.3.3 Pragmatism

The pragmatic paradigm has refused to join the ‘paradigm war’ that exist between the positivist and interpretivist research philosophies. Instead, pragmatism provides researchers with an alternative solution to this longstanding philosophical dualism (Wahyuni, 2012; Johnson & Anthony, 2004). Pragmatists believe that both the natural and physical worlds and emergent social and psychological context is important in research. According to Creswell (2007) a pragmatic approach can be taken as philosophy as it justifies the combination of qualitative research and qualitative research in the same inquiry. Thus, a simple definition of a pragmatic paradigm is more in line with paradigm combination and can be taken as ‘multi-paradigm research, which is a combination of positivism and interpretivism. Moreover, this study adopted a pragmatic paradigm because it is found to be associated with qualitative and quantitative research methods. The study of

phenomena in their natural environments is key to the interpretivist philosophy, while the positivist paradigm is found to be associated with quantitative research methods. Exploring students' perceptions on flipped classrooms in the lecture room allowed the researcher to make subjective interpretations of phenomena in a natural environment. Thus, the combined use of the positivist and interpretivist paradigms in its methodology was deemed relevant to this study as it aimed to determine whether flipped classrooms or traditional classrooms promote a positive learning environment for students.

These beliefs translate into the view that knowledge is based on the reality of the world we experience and in which we live. Pragmatism also prescribes to the principle of fallibilism, or the belief that research conclusions are rarely, if ever, considered to be either certain or absolute (Johnson & Anthony, 2004).

The pragmatic researcher will start with the research question and then determine the research framework that would be the most appropriate to answer that particular question. This means that a mixture of ontology, epistemology and axiology is acceptable in this paradigm in order to understand social phenomena. Researchers can make use of both quantitative and qualitative data collection methods as their research philosophy which is seen as a continuum rather than two extremes as explained in section 2 of this chapter (Wahyuni, 2012; Johnson & Anthony, 2004). The pragmatic paradigm is thus considered to be the most appropriate for this study as the researcher will make use of an action research design with a mixed methods data collection approach to explore the students' perceived experiences of flipped classrooms at a traditional university in comparison with the traditional classroom.

3.3.4 Research approach

A research approach may be classified as either inductive or deductive (Collis & Hussey, 2013). Inductive reasoning involves the formulation of recommendations based on the empirical observations. From these observations generalised conclusions can be reached (Collis & Hussey, 2013). On the other hand, deductive research involves the development of a theoretical structure which can then be tested empirically (Collis & Hussey, 2013). These two approaches are illustrated in figure 6.

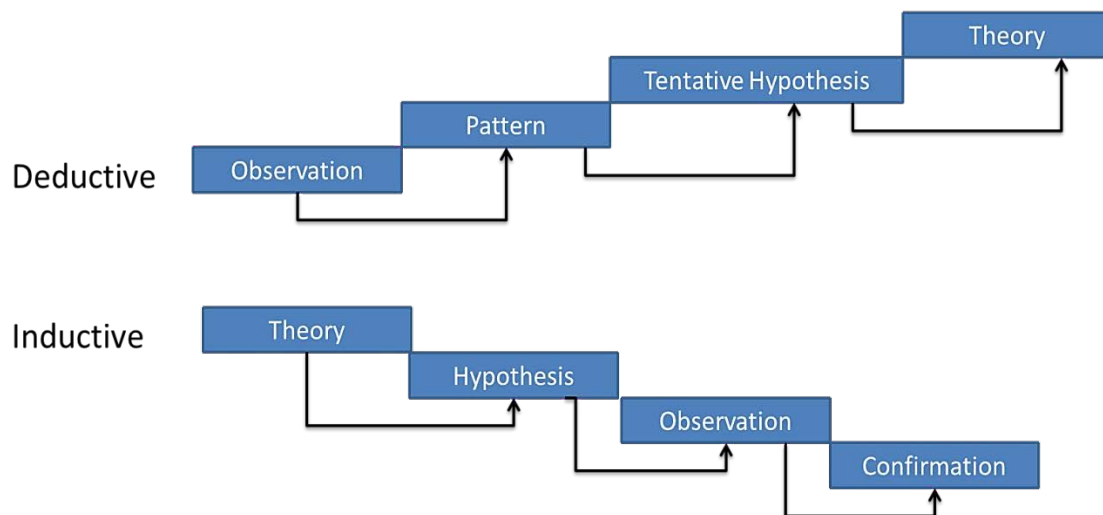


Figure 6: Differences between inductive and deductive logic (Collis & Hussey, 2013)

The approach adopted in this research was based on inductive reasoning. A thorough literature review was done at the start of the research after which specific research questions and sub-questions were formulated. The researcher then made use of both primary and secondary data collection methods in order to obtain evidence to answer these questions. In this project a preliminary literature review was conducted first to determine the extent of the implementation of the flipped classroom in higher education in South Africa. There after a mixed method approach was used to collect primary and secondary data from which general conclusions were drawn that could be used to identify the factors that will influence students' experience of a flipped classroom in higher education. Therefore, the time horizon of the study is cross sectional. The next section will discuss the research design of the study.

3.4 Research design

Carson, Gilmore, Perry and Gronhaug (2001) states that the research design specifies the methods and procedures for conducting a particular study. There are three categories that can be employed in a study: exploratory, descriptive and causal research. Exploratory research is normally undertaken when little is known about a particular research phenomenon, when the research problem is vague or if the researcher wishes to confirm that known information about a phenomenon is correct (Denzin & Lincoln, 2011). Descriptive research is used to clarify the main aspects of

a sample or field of study. In this type of research the objective is well defined and the researcher is able to provide a detailed analysis of the state of the problem. In contrast with the exploratory research design, the data collection methods are more formal and rigid (Denzin & Lincoln, 2011). The causal research design is used to investigate the causal relationship between two or more variables in a study. This design is most commonly used to to remove or reduce many sources of bias and threats to the internal validity of the variables under investigation. Exploratory and descriptive research designs nomally preceeds this type of study as more information is needed about the research variables. This study made use of a descriptive research design as the research problem is clear and formal measures are used for the data collection and analysis.

This study also made use of an action research design. The following is a quote form Jean McNiff who wrote extensively on action research in education:

Built into action research is the proviso that, if as a teacher I am dissatisfied with what is already going on, I will have the confidence and resolution to attempt to change it. I will not be content with the status quo.

(McNiff, 1988, p. 50)



Action research is an iterate method where the researcher determines the current state of affairs and then increase or resolve the identified problem through an intervention. This cyclical method continues until the researcher is satisfied that the problem has been solved. Therefore the cycles provide the researcher with the opportunity to learn, and apply this knowledge in subsequent cycles. The cyclical nature of action research is depicted in the diagram below.

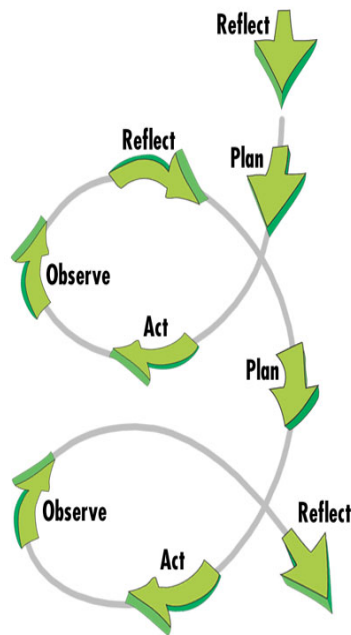


Figure 7: Action research cycles (McNiff, 1988)

There are several characteristics that set action research apart from other research. Collis and Hussey (2013) provide the following list of action research characteristics:

- **Action research is situation and context specific** – the study was conducted in a semester class with a group of second year students registered for the Introduction to Database course. The following are the learning outcomes of the course in Figure 6.1.

Figure 6.1: Learning outcomes of the module

Section Breakdown (Relevant Part)	Learning Objectives Theoretical Understanding	Learning Objectives Practical Application
PART ONE Database Systems	After completing this section, the learner should understand: • What a database is. • The role, functions and advantages of the Database Management System. • The difference between a file system, hierarchical data model, network data model, relational data model and object oriented data model. • The relational database model in depth. • The principles of set theory as they apply to databases and the principles of relational algebra (no prior knowledge is required).	After completing this section, the learner should be able to: • Distinguish between the different data models in terms of how each stores data. • Describe the basic elements of the relational model • Represent relations (tables) using relational algebra statements. • Be able to produce an Access table

Section Breakdown (Relevant Part)	Learning Objectives Theoretical Understanding	Learning Objectives Practical Application
PART TWO Design Concepts	After completing this section, the learner should understand: • Entities, attributes and relationships • Primary keys and foreign keys. • Relationship multiplicity comprising participation and cardinality (one-to-one, one-to-many, and many-to-many). • The entity relationship diagram (ERD). • Conflicting goals in database design • Specialization hierarchies and why they are useful • Use of composite primary keys for many-to-many relationships • Identifying design traps • Normalization of tables to reduce data redundancy	After completing this section, the learner should be able to: • Distinguish between entities and attributes • Select appropriate attributes to serve as the primary key of a table • Create relationships by selecting foreign keys • Create entity relationship diagrams to represent the data of a real world application • Create ERDs using specialization hierarchies • Create relational schema • Create dependency diagrams
PART THREE Structured Query Language (SQL)	After completing this section, the learner should understand: • Data Definition Language (DDL) commands to create tables, views, keys, constraints, indexes. • Drop and alter tables, views, constraints, indexes. • Data Manipulation Language (DML) commands to select, insert, delete, update, commit and rollback data and transactions. • Comparison operators, logical operators, special operators and aggregate functions. • Joins and subqueries. • Advanced query commands. • SQL functions, updatable views, triggers, stored procedures and embedded SQL.	After completing this section, the learner should be able to: • Use Microsoft SQL Server to create tables, views, keys, constraints, indexes. • Drop and alter tables, views, constraints and indexes. • Create queries to select, insert, delete, update, commit and rollback data and transactions. • Use comparison operators, logical operators, special operators and aggregate functions in queries. • Use subqueries, conditional restrictions in queries. • Select data from multiple tables using joins. • Use advanced commands, functions and updatable views. • Explain how triggers and stored procedures can be used.
PART FOUR Database Design and Implementation	After completing this section, the learner should understand: • How all aspects of designing a database fit together. • The Systems Development Life Cycle (SDLC) and the Database Life Cycle (DBLC). • Conceptual, logical and physical design elements. • Database security. • Database design strategies. • Basic database administration	After completing this section, the learner should be able to: • Explain the main processes involved in designing a relational database. • Describe alternative database development strategies. • Explain some of the key security and administration functions required to maintain a database. • Select appropriate file structures. • Explain how indexes work.

Section Breakdown (Relevant Part)	Learning Objectives Theoretical Understanding	Learning Objectives Practical Application
	responsibilities and tasks.	
PART FIVE Database Transaction Management	After completing this section, the learner should understand: • What is meant by a transaction. • How transactions are managed within a relational database using concurrency control. • Locking, time-stamping and optimistic methods of concurrency control. • Database recovery management.	After completing this section, the learner should be able to: • Define a transaction. • Explain how the different methods of concurrency control work. • Explain how a database can be recovered to avoid loss of data.
PART SIX The Data Warehouse	After completing this section, the learner should understand: • The difference between transaction processing systems and decision support systems. • Characteristics of operational data and decision support data. • What a data warehouse is. • What Online Analytical Processing (OLAP) is. • The use of multi-dimensional data. • OLAP architectures. • Relational OLAP (ROLAP), and multi-dimensional OLAP (MOLAP). • Star schemas for working with multi-dimensional data. • Implementing a data warehouse. • What data mining is. • SQL extensions for OLAP, comprising the rollup extension the cube extension and materialized views.	After completing this section, the learner should be able to: • Describe operational data and decisions support data. • Define a data warehouse and data mining. • Use a spreadsheet application to import data from a relational database for analysis in a pivot table, or pivot chart. • Explain what is meant by OLAP, ROLAP and MOLAP. • Explain basic ROLAP architectures. • Explain and use the star schema using Microsoft SQL Server. • Use the SQL extensions for rollup, cube and materialized views using Microsoft SQL Server.

• **Action research involves action, evaluation, and critical reflection and changes in practice that are then implemented after the results have been analysed** – The study was divided into three cycles. The first cycle involved 4 weeks of traditional lectures, the second cycle of 4 weeks introduced blended learning into the course, while the third cycle of 4 weeks changed the content delivery method to a flipped classroom. The following table provides an overview of the activities and communication during each cycle.

Table 6.2: Activities and communication during each cycle

	Activities	Communication and Assessments
Traditional cycle	Four weeks of lectures (twice a week)	Two practicals Focus group Questionnaire
Blended learning cycle	Four weeks of lectures that included technology during the lecture e.g. YouTube video	One practical One test Focus group Questionnaire
Flipped classroom cycle	Four weeks where students were given prep work prior to class (video or article to read online). Worksheets with activities were provided during class time.	One practical One test Focus group Questionnaire

- **Action research is participative and collaborative** – The nature of the flipped classroom makes it impossible to implement without the participation of the students. Throughout the 3 cycles the lecturer involved the students in an informal evaluation process, while at the end of each cycle and at the end of the semester there was a formal opportunity for the students to reflect upon the instruction method used in that cycle. The results of the evaluations were shared with the students as well as the interventions that occurred in the next cycle;
- **Knowledge is created through action and at the point of application** – The evaluations with the students were used to create knowledge that informed the study;
- **Action research can involve problem solving, if the solution to the problem leads to the increasement of practice** – The research problem investigated in this

study was the lack of communication and collaboration among students and lecturers at a traditional university in South Africa while the solution, an innovative new teaching technique, provided a way to increase these two issues.

Whitelaw, Beattie, Balogh and Watson (2003) state that action research is a commonly used method for scholarship of teaching because it provides the means to increase teaching practice. The scholarship of teaching is concerned with conducting research, identifying gaps, investigating alternatives, and correcting shortcomings in the teaching practice. This makes action research appropriate for this study as it can be used to evaluate and inform the future teaching practices of the lecturer. The next section discusses the population and sampling technique used in this study.

3.5 Population, sample and sampling technique

Population refers to a set of people who are under consideration for the particular study. The population in a study is any target group of individuals that has one or more characteristics in common that is of interest to the researcher for the purpose of gaining information and drawing conclusions (Collis & Hussey, 2013).



The target population for this study was the students that are registered for a semester course at the traditional university. As the design of the study makes use of an action research approach, the entire class of 130 students registered for the Introduction to Databases course were considered to be the population in this study. The course was chosen as it provides a mixture of theoretical and practical application. There is also a lot of resources available on the Internet for this subject which assisted the lecturer to identify appropriate content and resources.

A research sample consists of a group of participants from the entire population that has been selected to participate in the research (Oates, 2006). This sample must be carefully chosen in order to ensure that it is unbiased and represent the views of the entire population (Collis & Hussey, 2013).

The process of deciding on a particular sample from the population in a study is called sampling. Babbie and Moutton (2005) identify two types of sampling methods called probability sampling and non-probability sampling. Probability sampling is the most common method where the research selects large representative samples for

social science research and political polls. In contrast, non-probability sampling relies on available subjects, purposive, snowball and quota as the sampling strategies. For this research, the researcher used non-probability sampling, specifically purposive sampling.

Purposive sampling was used in this study to determine which students was part of the focus group that evaluated the three different cycles. Silverman (2010) argues that many qualitative researchers employ purposive instead of random sampling techniques to seek out groups, settings and individuals where the processes being studied are most likely to occur. Purposive sampling is therefore relevant in this study as the goal is to find students who are willing to describe their experiences related to the phenomenon in question - the transition from a traditional lecture based to a flipped classroom. The lecturer asked for volunteers in the class and approached students who were considered to be good candidates to participate in the focus groups (10 students per cycle). However, the entire class of 130 students were asked to participate at the end of each cycle in the questionnaire that evaluated their perceptions of the instruction method after each cycle.



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3.6 Research choices

Once the researcher has designed the study, the decision must be made which data collection methods to use to answer the research question. Qualitative data collection methods are associated with the Interpretivistic research paradigm, while quantitative data collection methods are seen as part of the Positivistic research paradigm. A third paradigm, pragmatism, allowed the researcher to employ a combination of both qualitative and quantitative data collection methods (Collis & Hussey, 2009).

3.6.1 Qualitative data collection methods

This type of research is commonly associated in the social sciences context to understand or explain events, human behavior or the cause of the research problem. The most common characteristics of qualitative data includes a low number of respondents, but very detailed and indepth understanding of the research problem. Furthermore, this is an subjective method that can be used to define life experiences and circumstances of the research participant and provide significance to these

events (Denzin & Lincoln, 2011). In order to achieve these characteristics, the most commonly used methods in qualitative research is case studies, observations, in-depth interviews, action research, physical experiences, theories, social interactions, surveys and expert reviews (Collis & Hussey, 2013).

3.6.2 Quantitative data collection methods

This type of research data collection method is associated most commonly with research experiments that are conducted in a controlled environment or measured numerically by using close-ended questions. As opposed to qualitative data collection methods, quantitative data collection methods provide a high number of respondents, but less detailed information. This type of data collection method is often used in descriptive studies to quantify information and provide an outcome that can be generalised from the study sample to the study population (Creswell, 2014). Quantitative research methods often include written surveys, questionnaires, observations, experiments, methods and theories. The data is often analysed statistically (trends, mean and medians), while information is displayed in a statistical format e.g. graphs and tables (Collis & Hussey, 2013).



3.6.3 Mixed methods research

Mixed methods research is defined as *"the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study"* (Johnson & Anthony, 2004, p. 120).

This type of data collection method advocates that the most appropriate methodological tools must be used to answer the research question. Mixed methods thus provides the researcher with an alternative to the above mentioned data collection methods as both qualitative and quantitative data can be collected (Punch, 2006). This study made use of mixed method data collection tools as both the subjective experience of the students that participated in the flipped classroom was investigated as well as their objective evaluation of this type of teaching style.

There are six different designs that can be used in a mixed methods study. These designs include convergent, explanatory, embedded, transformative, multiphase and exploratory (Creswell, 2014). Figure 8 illustrates the mixed method design that was used in this study.

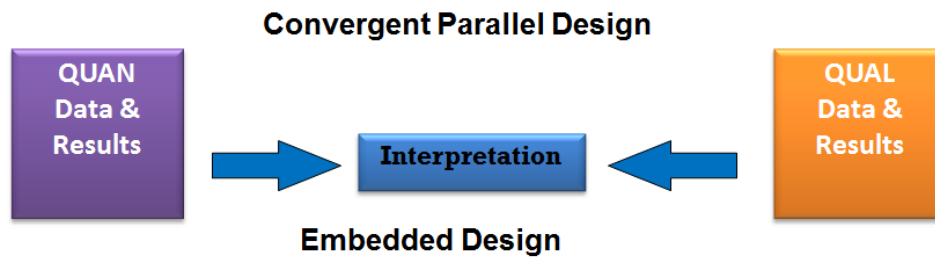


Figure 8: Convergent Parallel Design (Creswell, 2014)

This study used the convergent parallel design as the researcher collected and analysed qualitative data and quantitative data during the three cycles. The information collected was then used to generalise the findings (Punch, 2006). In this study, qualitative data was collected from the students making use of focus groups, as well as the research diary and observations from the lecturer. At the end of each cycle the students completed a questionnaire about their perceptions of the instruction style during the cycle while a class evaluation, which all the students completed, were conducted at the end of the term. The next section will discuss the data collection tools that were used in this study in more detail.

3.7 Data collection methods



Data can be collected in two forms: primary and secondary data. Primary data is collected in order to answer a specific research question and is gathered directly from the study participants. On the other hand, secondary data has been collected previously for a different study and is now being used to support the findings of the current study (Myers & Klein, 2011). Sources of secondary data include databases and published materials such as books and articles (Cooper & Schindler, 2003). This study made use of focus groups, a questionnaire, field notes and observations from the lecturer during the classes as the primary data sources, and a literature review as the secondary data source. Both of these methods are discussed in the next sections.

3.7.1 Primary Data Collection Methods

This section provides an overview of the primary data collection strategies. Primary data was collected from the students making use of focus groups, interviews, a class

assessment and a questionnaire, while the lecturer provided field notes and observations to this pool of information.

3.7.1.1 Focus group

A focus group is a guided discussion with a small group of people making use of a facilitator that used semi-structured questions to ensure that all important issues are discussed (Babbie & Mouton, 2005). The facilitator must further be flexible enough to allow group-initiated concerns to surface and be unpacked. The most important benefit of this data collection technique is the insight gained from the students' interaction of ideas among each other. However, if some of the students are introverted; they may not be comfortable providing their opinion in a group. In contrast, other students may dominate the discussion. For these reasons it is important to choose the students and facilitator of a focus group carefully (Mertens, 2005).

This study collected data from the focus group after each cycle was completed. The researcher approached eight students that were willing to participate in each of the focus groups. Also, the focus groups made use of an external facilitator. The reason for this was to avoid potential bias as the student was also the lecturer for the Database. It was deemed prudent as the students may not be comfortable providing feedback about the class to the lecturer. The interview schedule that the facilitator used was based on the work of Shantakumari and Sajith (2015) who investigated students' perceptions of a blended classroom in the Gulf Medical University, UAE. The Cronbach alpha reliability coefficient of the questionnaire was reported to be 0.87, indicating that the instrument was reliable. A pilot study was conducted prior to the focus group to test the questions for user-friendliness and unambiguity. The focus groups were recorded and transcribed. Each participant was given an identifier by the facilitator. The identity of the students and identifiers were only known to the facilitator, not the researcher. The researcher, therefore, could not be prejudiced toward any student in class.

3.7.1.2 Questionnaire

The questionnaire remains a popular option with which to gather information as it is inexpensive to administer, is able to reach a large number of respondents and, when open-ended questions are used, provides rich information (De Vos, et al., 2005). The limitations of a questionnaire include a potentially high non-response rate,

students providing untrue but socially acceptable answers and students failing to answer some questions (Brink, Van der Walt & Van Rensburg, 2006; De Vos, et al., 2005).

In this study, two questionnaires were used to supplement the findings from the focus groups and interviews which were conducted with the students. The questionnaire was completed during class time at the end of each cycle in a paper base format. The first questionnaire used determined the post cycle reflection of the students and is called the Student Perception of Instruction Questionnaire (SPIQ). The questionnaire was adapted from the work of Johnson and Renner (2012) who investigated the effects of a flipped classroom model on a secondary computer application course in the United States of America. The work had been cited 63 times in the past four years in a variety of contexts, and thus represented a valuable tool for this study. The SPIQ had 13 Likert-scale items that were previously assessed for internal consistency reliability. At the end of the questionnaire was an open-ended question entitled "Please provide suggestions for how to increase this course, or any other general comments" to give the students with the opportunity to provide additional information they may have thought relevant. The instrument had a Cronbach alpha coefficient of 0.75 which yielded internal consistency and reliability coefficients that were acceptable. Items of the questionnaire were consistent with the evaluation of experiences concerning a curriculum with hybrid approaches to instruction (face-to-face lecture/blended learning and flipped classroom instructional technology) (Johnson & Renner, 2012).

The second questionnaire was delivered in the form of an online evaluation which the class members were asked to complete. In order to do this, a set of pre-defined and standard questions (close- and open-ended) were used. The researcher identified the relevant questions with the help and support of the Teaching and Learning Centre which is responsible for the evaluation of courses at the University. The students were then asked to complete the online evaluation in order to provide the researcher with data that could be analysed and interpreted (Oates, 2006). The two questionnaires are included in Appendices D and E.

3.7.1.3 Observations

Participant observation is a special type of observation as the researcher is not a passive observer, but can assume a variety of roles within a fieldwork situation. In some cases, the researcher may even participate in the actions being studied. This type of data collection method has been used most often in anthropological studies where different cultures and social groups are being studied (Yin, 2014).

There are many benefits to this approach, the first being that the researcher often gains access to events or groups that are otherwise not accessible to researchers. The second advantage is the ability of the researcher to perceive reality from the view point of someone 'inside' the research case, while the third advantage speaks to the researcher's ability to manipulate minor events in order to produce a greater variety of situations from which to collect data. These advantages also introduce bias into the study as the researcher has less ability to work as an external observer. Further problems include the researcher becoming a supporter of the research group, or not having enough time to collect data. Table 7 below weighs up the strengths and weaknesses of this approach (Yin, 2014; Creswell, 2014).



Table 7: Strengths and weaknesses of participant observation (Yin, 2014)

	Strengths	Weaknesses
Participant observation	Immediacy – actions are covered in real time Contextual to the case Insight of research into interpersonal behaviour and motives	Time-consuming Selectivity of coverage Reflexivity – participants may behave differently as they are being observed Expensive Possible bias due to the participant-observer's manipulation of events

In this study, the researcher is a participant in the class, and must therefore use participant observation to collect data during each class. The researcher provides a 'snap shot' of the class as part of her observations. The observations included the

general interest of students in the class, their willingness to participate in class activities and how prepared they were for these activities.

3.7.1.4 Field notes

The researcher will make of field notes as a running description of the participants, events, settings and behaviours of the research participants. The purpose of field notes is not to produce an exact account of what happened during the study, but rather to record events and behaviours that were of particular interest to the researcher. The notes are then interpreted by the researcher in terms of his/her specialised knowledge and expertise (Babbie & Mouton, 2005).

While field notes are very subjective, it is the most commonly used narrative record. Therefore, the researcher must provide an accurate and precise account of the events s/he wishes to record as this contributes to the scientific merit of the notes. In order to accomplish this, the researcher in this study made the field notes directly after class making use of free writing. The field notes noted any events that the researcher felt was important to the general flow of the class and her experiences of the teaching pedagogy during the class and were recorded formally (Yin, 2014). The classification system used by the researcher ensured that the notes were organised, categorized, complete and available to outsiders when needed.

In this section the five primary data collection methods used in this study were discussed. In the next section the secondary data collection method used in this study, namely, a literature review, will be discussed.

3.7.2 Secondary Data Collection Methods

According to Myers and Klein (2011), secondary data can be used to support the current study. Secondary data was collected previously by other researchers for their own study but is now archived and is freely available to other researcher's. The secondary data collected for this study involved an extensive and thorough literature survey of relevant Internet sources, journal articles, past research, reports and books (Olivier, 2009).

The main disadvantage of secondary data is the difficulty in searching for and retrieving sources of data that would be useful to the current research problem. In addition, the quality of the information must also be evaluated in order to ascertain whether it will meet the research and methodological requirements of the current study (Myers & Klein, 2011). During the research period for this study all possible efforts were made to ensure that the content of the research remained as current as possible.

3.8 Trustworthiness and credibility of data

Trustworthiness of qualitative data refers to the credibility, dependability, transferability and confirmability of the data. Table 3.3 below provide a definition for these terms as well as how the trustworthiness of the qualitative data was preserved in this study.

Table 8: Evaluation of Interpretivist research (Wahyuni 2012; Saunders et al., 2009; Oates, 2006)



Evaluating Criteria	Definition	Application in this study
Trustworthiness	Refers to the accuracy of the collected data	The questionnaires was compiled using questionnaires found in literature. The collected data was cleaned and verified after capturing. The study made use of data triangulation to ensure the trustworthiness of the research data. Data was collected making use of field notes, focus groups, interviews and a formal evaluation of the course. The data from the various sources provided support for the findings as it agrees with each other.
Confirmability	Refers to the researcher's ability to track the data collected to its source while the logic that is used to interpret the data should be made explicit	Multiple data collection techniques were used in this research in order to produce the artefact. In order to accomplish these tasks, a confirmability audit was conducted that includes the recorded focus groups and interviews be transcribed verbatim to ensure the accuracy and traceability of the results.
Dependability	Refers to the ability of the researcher to account for and describe the changes	The researcher kept detailed and comprehensive field notes that allowed cross-checking the observational findings. This eliminated inaccurate interpretations as a dependability

	that occur in the research setting and how these changes affected the way the researcher approached the study	audit was conducted.
Credibility	Refers to the results obtained from qualitative research is believable from the perspective of the participant in the research	Observations were made after each class and during various phases of the 3 cycles. This procedure is called prolonged engagement and persistent observation. Member checking was used where the researcher makes their notes and transcripts available to the supervisor while the findings of the study were shared with the students. The supervisor can be used as an objective observer that made sure that the conclusions drawn from the notes and transcripts were valid. Reflexivity allowed the researcher to share the identity, language and experiential base with the students. The membership role of the researcher, that was part of the class, provided the researcher with legitimacy and acceptance in the classroom which means that the students were more likely to provide relevant information.
Transferability	Level of applicability in other settings or situations	The study included a rich and thick explanation of the research sites and characteristics of case studies in order to enhance the transferability (see Chapter 2). Transferability was achieved as the research model may be applied to other inter-organisational settings with similar characteristics.

3.9 Reliability and Validity of data

The study will also collect quantitative data in the questionnaires. Validity is defined as 'the extent to which the research findings accurately represent what is really happening in the situation' (Welman, Kruger, & Mitchell, 2005, p. 142). This will be achieved if the instrument (a questionnaire) used in the study allows the researcher to measure the students' experiences of a flipped classroom at a traditional university in South Africa. Also, triangulation is used to compare the results from two or more known sources of information. In this study, data will be collected from a literature review, students and the lecturer.

Reliability is defined as 'concerned with the findings of the research and relates to the credibility of the findings' (Welman, Kruger, & Mitchell, 2005, p. 145). This will be obtained if the results of the study are comparable with previous results in literature, therefore the instrument of the study can be considered to be reliable. The Alpha Cronbach of the questionnaire was found to be reliable. Generalisability relates to the reliability of the scores obtained. The scores obtained from the questionnaire should be consistent irrespective of the time of the measurement, the test used or who administered the test. The validity and reliability of the questionnaire that were employed were tested using a pilot study. The Cronbach's coefficient alpha scores was applied to calculate each sub scale in order to test the reliability and consistency of the instrument. The next section presents the data analysis used in this study.

3.10 Data Analysis

This study made use of both qualitative and quantitative data in order to answer the research question. Both these types of data must be processed before it can be deemed information and become useful to the researcher. Creswell (2014) states that qualitative data analysis typically involves the analysis of text from interviews or field notes transcripts. Thematic analysis was used to analyse the qualitative data that was collected making use of the field notes, observations and focus groups. Thematic analysis was conducted making use of the following techniques:

- Word analysis which includes word repetitions and keyword searches;
- Reading of large units to compare or search for missing information;
- Intentional analysis of linguistic features e.g. metaphors or transitions;
- Physical manipulation of texts and
- Secondary data analysis.

In this study all these techniques was used to analyse the qualitative data. Furthermore, the data collected was analysed by making use of descriptive analysis which includes transcribing the data, segmenting and coding the data, counting words and code categories, searching for relationships and themes in the data, and interpreting the data. In order to complete all these steps, the qualitative data analysis tool NVivo was used.

The quantitative data collected via the final evaluation was analysed and the responses summarised to be meaningful and to identify trends through the use of descriptive statistics. The quantitative data collected was cleaned and imported into SPSS V24 to allow for analysis of the data. The data was present making use of the mean, maximum, minimum and standard deviation. The responses was summarised to be meaningful and to identify trends through the use of descriptive statistics e.g. graphs, tables or charts. The next section will discuss the ethical considerations of this study.

3.11 Ethical issues

Punch (2006) maintains that it is the researcher's responsibility to ensure academic integrity and honesty, as well as to respect other people. In order to ensure that ethical principles were fully observed and to guarantee the confidentiality of the study participants who had been recruited to participate in the study, the following measures were taken:

- The Research Ethics Committee (UREC) of the University of Fort Hare approved the study (Certificate Reference Number: DRA041SCILL01- see Appendix A).
- Wilful participation – Participants was encouraged to participate in this research willingly and without any due force. Students was encouraged to participate in the focus groups, interviews and final evaluation, but was not forced to do so.
- Withdrawal – Participants was allowed to withdraw from this research at any time that they feel their rights are not being considered. Students that have participated in the focus groups or interviews were able to withdraw from future activities without any fear of prejudice.
- Informed consent – Prior to the collection of the data, the participants was informed of how the data collected from them was to be used, as well as any third parties that may have access to it. Students were informed at the start of the course that there would be 3 teaching cycles and that the data collected after each cycle was going to be used for the purposes of a study.

- Anonymity and confidentiality– Participants' identity and location will be withheld unless they provide explicit permission for it to be disclosed. Students that participate in any of the data collection methods were not identified in any way when data was collated. Students were given a pseudonym by the person conducting the focus groups and interviews prior to transcribing the audio recordings.
- Misuse of results – Information gathered from the students was only used for the intended and expressed purpose of the research and in its original state, free of manipulation or adaptation.
- The raw data was securely stored and proper access control measures were put in place.

The researcher was aware of the above ethical considerations, and all reasonable efforts were taken to conduct the research without malice or prejudice to the respondents and to present the findings and conclusions honestly. The participant consent form that was used to inform the study participants prior to the focus groups and interviews of their rights is included in Appendix D.



3.12 Conclusion

This chapter provided a detailed description of the manner in which this research was conducted. The chapter first discussed the different paradigms that are available to the researcher after which the conclusion was that the Pragmatism paradigm is the most suitable for this study. In accordance with this paradigm, a inductive research approach and action research design was chosen for this study. Mixed method data collection included qualitative data (observations, field notes, focus groups and interviews) as well as quantitative data collection (class evaluation and student's reflection after each cycle). The next section identified the study population, students registered for a database course, and determined that purposive sampling will be used to select the students for the focus groups and interviews. The data analysis and trustworthiness issues were discussed in the next section after which the chapter concluded with a list of the ethical issues considered applicable to this study. As this chapter has described the research design and methods, the next chapter will report on the findings and analysis of the process.

Chapter 4: Data analysis and presentation

4.1 Introduction

The purpose of the study is to respond to the main research question, which sought to investigate what are students' perceived experiences of a flipped classroom at a traditional South African university in comparison to the traditional classroom.

As discussed in the previous chapter, data was collected through a mixed method approach with a questionnaire, focus group and the observations from the researchers in the form of a research diary. The data was analysed making use of a descriptive statistics and thematic analysis after which these results are discussed in the context of the literature review in chapter 2. This chapter starts by providing the demographics of the students that participated in the study in order to contextualise the case study followed by the descriptive statistics of the questionnaire and finally the thematic analysis of the interviews that were conducted with the students as well as the observations from the lecturer.



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4.2 Demographics

The study population was the 130 students registered for a second year Introduction to Database course in the second semester of 2016. From this population group, 51,5% of the students were in their second year of study, 30.8% were in their 3rd year of study and 17.7% had already completed more than 3 years of study for the 3 year degree. This is congruent with the findings from the university that only 37% of the students will complete a 3-year degree in the minimum time required (M & C Faculty Operational Plan, 2018).

The study population consisted of students registered for degrees in the Faculty of Management and Commerce. The course, Introduction to Databases, is a core subject for the students registered for a BCom Information Systems degree, and an elective for students registered for the other degrees in the Faculty. Table 9 provides the breakdown of the percentages for students in the class registered for each

degree. As expected, the biggest percentage of the class consists of students registered for the Information Systems degree.

Table 9: Percentage of students registered for each degree

Degree Code	Degree Name	Frequency	Percentage (%)
60005	B OF COMMERCE (GENERAL)	40	30.8
60100	B OF COMMERCE (GENERAL) (Foundation)	11	8.5
60011	B OF COMMERCE (INFORMATION SYSTEMS)	50	38.5
60101	B OF COMMERCE (INFORMATION SYSTEMS) (Foundation)	6	4.6
60008	B OF ECONOMICS (BUSINESS SCIENCES)	23	17.7

4.3 Data reduction



Data analysis comprises three activities that can occur simultaneously. These activities include data reduction, data display and finally the conclusions that are drawn from the data presented (Mutshinyani, 2002). Miles and Huberman (1984) propose a methodology for productive qualitative research that also provides a model for quantitative research (Diagram 9).

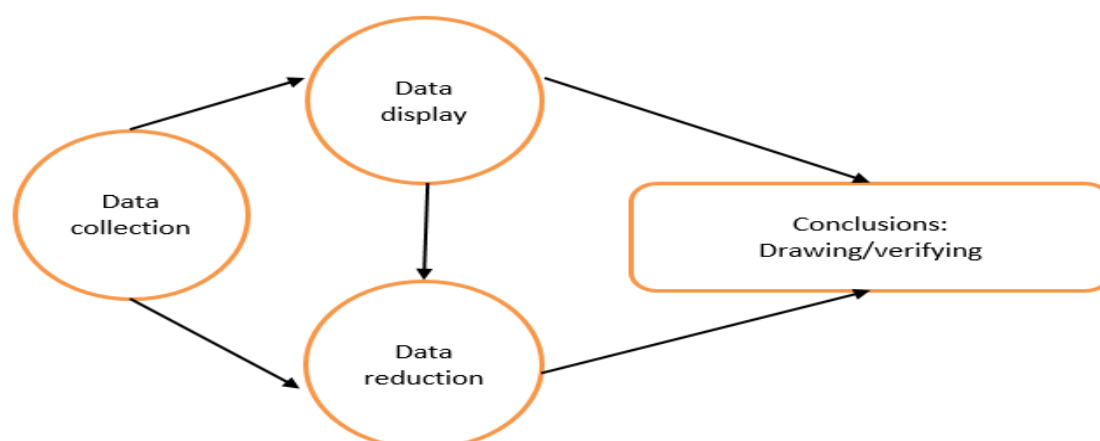


Figure 9: Components of data analysis (Miles & Huberman, 1984)

Data reduction is the selection, simplifying and transforming of the data that appear in written-up field notes or transcriptions (Mutshinyani, 2002). This provides the researcher with the ability to only analyse and interpret the critical information, which is in line with the objectives of the study, and not all data that was collected from the participants. In this manner large amounts of numerical and textual data can be reduced into meaningful parts.

4.4 Quantitative analysis

The following section will provide the results from the questionnaire that was used to quantitatively investigate the perceptions of the

4.4.1 Response rate

The questionnaire was used to determine what are students' perceived experiences of a flipped classroom at a traditional South African university in comparison to the traditional classroom. The questionnaire was distributed to the students after each cycle of the study was complete; hence there are 3 sets of data.



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The response rate of the study refers to the percentage of students who completed the survey from the total study population. The response rate after the first cycle (traditional teaching method) was 61.5% while the response rate after the second cycle (blended learning) increased to 63.1%. However, the response rate for the 3rd cycle where the flipped classroom was used decreased to 26.2%. The reason for the decreased response rate was the #feesmustfall protests that was held during September/October 2016 by the students. While this provided the ideal opportunity to implement the flipped classroom approach as it provided students with the opportunity to continue their studies during the protests, the class attendance after the protests decreased dramatically. The quantitative results from this phase will be strengthened by the qualitative interviews that was held after cycle 3 was completed. The overall response rate for the 3 cycles were 50.3%, which is deemed appropriate for the study when using the guidelines that Oates (2006) put forward that states that a response rate of 30% or higher is acceptable in a research study. Thus, this study's response rate was considered to be acceptable.

4.4.2 Descriptive statistics

This section provides the descriptive statistics of the questionnaire that was used to collect data about the various teaching pedagogies after each cycle. The section will start with the reliability of the questionnaire, followed by the statistics for each of the 4 categories presented in table and graph format.

4.4.2.1 Reliability of the questionnaire

The study made use of Cronbach's alpha to test reliability analysis. Leech, Barrett, and Morgan (2004) state 0.50 is considered to be a medium reliability while a Cronbach alpha of 0.700 or above is considered to indicated good reliability of the instrument. Table 10 indicates that the results from the 3 cycles of the study have a good degree of reliability because each was computed above 0.700 (Venkatesh et al., 2003). The overall Cronbach's alpha for the study was 0.773. The table 10 below presents the reliability analysis of the study.

Table 10: Alpha Cronbach

Cycle	Alpha Cronbach
1 – traditional learning	0.877
2 – blended learning	0.750
3 – flipped classroom	0.767
Over all	0.773

4.4.2.2 Categories of findings for questionnaire

The previous section presented the results from the demographic information, response rate and reliability of the questionnaire. The next section discusses the questionnaire findings on the various categories that were identified that may influencing students' experience of a flipped classroom at a traditional university in South Africa. These categories include communication with peers and the lecturer, learning strategies, technical assistance and the overall perception of the various pedagogies.

4.4.2.2.1 Questionnaire findings: Communication with peers and lecturer

One of the distinguishing characteristics of the flipped classroom is that it provides more opportunities for the students to interact with one another and the lecturer (Bergman & Sams, 2012). In this regard, the questionnaire included two questions to

investigate the students' perception of how communication was affected making use of the traditional, blended learning and flipped classroom approaches. These results are displayed in table 11.

Table 11: Results for communication with peers and lecturer category

Question		Mean	Standard Deviation	Minimum	Maximum	Results (%)					
						Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
For the past four weeks in this class, I communicated a lot with other students.	Cycle 1	2.52	1.197	1	5	17.7	45.6	11.4	17.7	7.6	
	Cycle 2	2.03	0.842	1	5	22.5	61.3	10.0	3.8	2.5	
	Cycle 3	2.00	0.750	1	4	21.2	63.6	9.1	6.1	0	
For the past 4 weeks in this class I talked with the lecturer	Cycle 1	3.99	1.294	1	5	7.7	7.7	14.1	19.2	51.3	
	Cycle 2	3.57	1.141	1	5	4.0	14.7	26.7	29.3	25.3	
	Cycle 3	3.81	1.091	1	5	3.1	12.5	12.5	43.8	28.1	

As can be seen from Table 11, the communication between both the student-to-student and student-to-lecturer increased from Cycle 1 to Cycle 3 (1 = strongly agree; 5 = strongly disagree). The mean for the student-to-student interaction increased by 0.52, which indicate that the class exercises, which was done in groups, did contribute to the increased communication. Similarly, the percentage of students that agreed or strongly agreed with the statement increased from Cycle 1 (63.3%) to 83.8% in Cycle 2 and finally to 84.8% in Cycle 3.

The mean for the student-to-lecturer interaction increased from Cycle 1 (traditional classroom) by 0.42, but decreased after Cycle 3 (flipped classroom) to 3.81. The students that agreed that the interaction had increased during the cycles also followed a similar trend (15.4% - Cycle 1; 18.7% - Cycle 2 and 15.6% - Cycle 3). This result can be contributed to the continued disruption of the #feesmustfall protests that happened during this cycle. However, the results still shows that the communication between the student and lecturer increased as compared to Cycle 1.

4.4.2.2.2 Questionnaire findings: Learning strategies

The pedagogy of the flipped classroom requires the lecturer to move instruction from the group learning space to the individual learning space. While it is important that the learning strategies of students must also adapt and change to accommodate technology in learning, this is especially important in the flipped classroom (Bergman & Sams, 2012). This section provides the results that probed the students' perceptions of the three cycles as it relates to various learning strategies as shown in Table 12.

Table 12: Results for learning strategies category

Question		Mean	Standard Deviation	Minimum	Maximum	Results (%)				
						Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The assignments and projects I have worked on in this course deal with real life applications and information.	Cycle 1	2.23	0.947	1	5	19.0	51.9	20.3	5.1	3.8
	Cycle 2	1.73	0.689	1	4	39.5	49.4	9.9	1.2	0
	Cycle 3	1.94	0.827	1	4	30.3	51.5	12.1	6.1	0
The availability of course materials,	Cycle 1	2.28	0.960	1	5	16.5	54.4	17.7	7.6	3.8

communication, and assessment tools helped me increase my learning.	Cycle 2	1.79	0.607	1	4	28.4	66.7	2.5	2.5	0
	Cycle 3	1.82	0.917	1	5	39.4	48.5	6.1	3.0	3.0
	Cycle 2	2.16	0.661	1	4	11.1	65.4	19.8	3.7	0
	Cycle 3	2.24	0.830	1	4	18.2	45.5	30.3	6.1	0
For the past 4 weeks, I have explored my own strategies for learning.	Cycle 1	2.38	0.991	1	5	13.9	53.2	17.7	11.4	3.8



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The mean and average percentage of students that agreed with the statements included in this section all increased from Cycle 1 to 3, but the biggest improvement can be seen in Cycle 2 which represented the blended learning approach. The exception is the last statement where the students indicated that they agreed with the statement during Cycle 2, but did not feel that they explored their own strategies for learning during Cycle 3. This can indicate that while students view both the blended learning and flipped classroom approaches favourably, they may prefer the blended classroom approach. The results can also indicate that the most experiential learning took place during cycle 2, where technology was introduced for the first time. When cycle 3 started, the students were already used to the concepts of real-life examples to illustrate the practical value of theory learned, technology in the classroom to improve access to resources and to change their learning strategy.

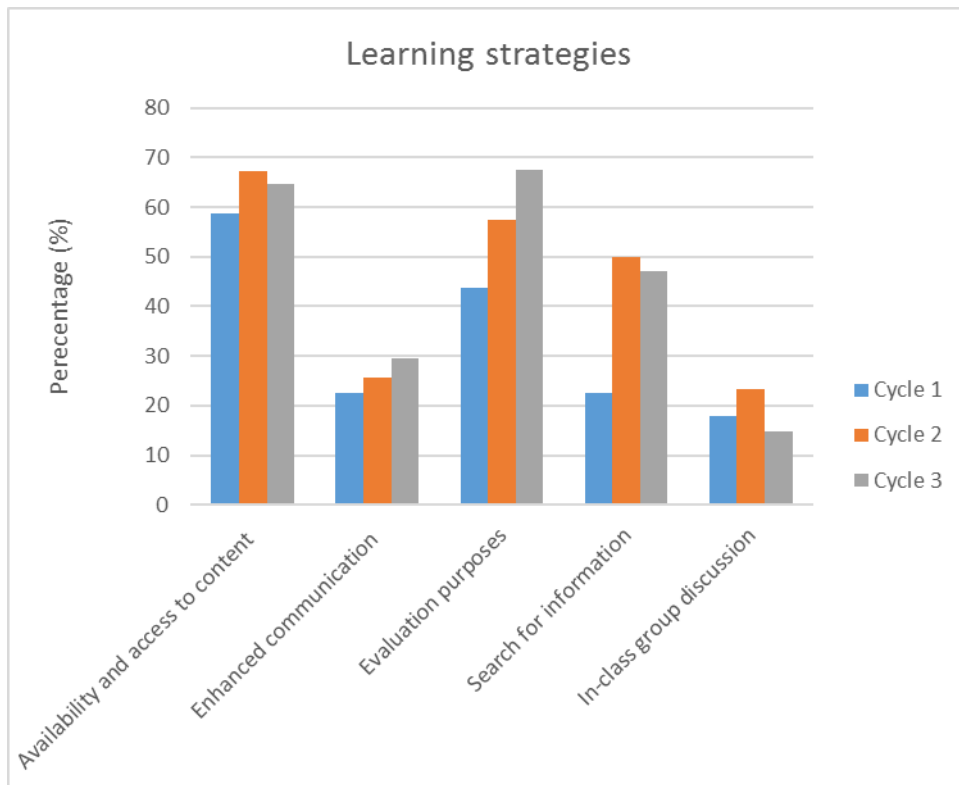


Figure 10: Factors that influences learning strategies



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The two most important factors that influenced the learning strategies of students were found to be the availability and access to content and evaluation that was done making use of class exercises and assignments. This is supported by the big increase in the factor called 'search for information' that attributes to the students' ability to search for information to understand the content of the course and provide solutions to the practical application that were presented to them to further enhance their knowledge of databases. These 3 factors are congruent with the blended learning and flipped classroom approaches that advocate students to become independent thinkers and lifelong learners (Roehl, Reddy & Shannon, 2013).

The factor with the least influence were found to be the communication both in class and outside of class. The in-class group discussions, followed by the enhanced communication outside the classroom making use of email and online discussion were considered by less than a third of the students as important to influencing their learning strategies. The communication that occurred in class were considered more favourably by the students during cycle 2 than cycle 3, which is similar to the findings

in table 11. A possible explanation for the poor results could be that the students already felt that they could communicate in and out of class with the lecturer or that the #feesmustfall protests impeded on communication during this time as the classes were suspended.

4.4.2.2.3 Questionnaire findings: Technical assistance

This section asked the students to consider the amount of technical assistance that is required to implement specifically the blended and flipped classroom approaches. Two questions were included in the section and the results are provided in table 13.

Table 13: Results for technical assistance category

Question		Mean	Standard Deviation	Minimum	Maximum	Results (%)					
						Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
Over the past 4 weeks, I have needed technical assistance for this class.	Cycle 1	2.51	1.143	1	5	22.1	32.5	20.8	22.1	2.6	
	Cycle 2	1.99	0.829	1	5	27.2	53.1	14.8	3.7	1.2	
	Cycle 3	2.24	0.969	1	5	18.2	54.5	15.2	9.1	3.0	
For the past 4 weeks, availability and access to technical support and resources has helped me increase my learning.	Cycle 1	2.29	1.0331	1	5	24.4	35.9	29.5	6.4	3.8	
	Cycle 2	2.06	0.812	1	5	21.0	59.3	13.6	4.9	1.2	
	Cycle 3	2.03	0.847	1	4	30.3	39.4	27.3	3.0	0	

Students indicated that they needed and increasing amount of technical assistance during the class as the cycles progressed from the traditional classroom (54.6%) to

the blended learning approach (80.3%). This is not surprising as the technology requirements are more as per the definition of the blended learning approach. The amount of technical assistance decreased slightly in the last cycle, the flipped classroom approach (72.7%) which could imply that the students had learned how to navigate or solve some of the technical problems they experienced during the previous cycle.

A similar trend can be seen in the results for the second question, which asked the students to consider the technical support and resources available to increase their learning. The students that agreed with the statement is recorded at 60.3% during the first cycle, 80.3% for the second cycle and 69.7% for the last cycle. The students do have access to computer laboratories at the university, WiFi facilities at the university and residences and a helpdesk in the ICT department. Furthermore, the students completed an Introduction to Computer Literacy course in their first year.

4.4.2.2.4 Questionnaire findings: Perception of teaching pedagogies

This section investigated the students' perception of the three teaching pedagogies that were used during the study. The students were asked to consider the amount of work that is required during each cycle, if they enjoyed the particular teaching pedagogy and if they would choose such a course again. The results are displayed in Table 14.

Table 14: Results for teaching pedagogy category

Question		Mean	Standard Deviation	Minimum	Maximum	Results (%)				
						Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
For the past 4 weeks, I have had to work hard in this course.	Cycle 1	2.24	0.950	1	5	17.7	54.4	17.7	6.3	3.8
	Cycle 2	1.81	0.743	1	5	34.6	51.9	12.3	0	1.2

	Cycle 3	1.97	0.684	1	4	21.2	63.6	12.1	3.0	0
I have learned a lot in this course so far.	Cycle 1	1.95	0.896	1	5	28.2	59.0	6.4	2.6	3.8
	Cycle 2	1.67	0.524	1	3	35.8	61.7	2.5	0	0
	Cycle 3	1.79	0.781	1	4	36.4	54.5	3.0	6.1	0
I would choose to take another course like this one.	Cycle 1	2.43	1.268	1	5	24.1	40.5	15.2	8.9	11.4
	Cycle 2	2.15	1.152	1	5	29.6	46.9	11.1	3.7	8.6
	Cycle 3	1.97	0.770	1	5	21.2	66.7	9.1	0	3.0

As expected, the students indicated that the second and third cycles required more effort from them than the first cycle (traditional classroom). The percentage for the second and third cycles were similar with 86.5% and 84.8% respectively in relation to the first cycle where only 72.1% of the students recorded a similar response. The traditional classroom is a passive teaching learning environment where the student 'absorbs' the knowledge from the lecturer. While the student is still expected to complete assignments and study for tests, the involvement in and preparation for class is much less (McLaughlin, et al., 2014).

The students felt that they had learned more in the blended classroom approach (97.5%) than during the other two cycles (87.2% - traditional and 90.9% - flipped classroom). This could be attributed to the novelty of using technology during cycle

2, which became less interesting as the students had to take responsibility for their own learning during the last cycle.

Lastly, the students were asked if they would take another course making use of the three teaching pedagogies. Two thirds of the class (64.6%) indicated that they would take a class that made use of the traditional classroom approach, while 76.5% indicated that they would consider a class that made use of a blended classroom approach. The students were the most positive about the flipped classroom approach with 87.9% indicating that they would consider enrolling for a class that made use of this teaching pedagogy. The next section will discuss the thematic analysis of the interviews with the students and lecturer-participant observations made during the study.

4.4.3 Thematic Analysis

The previous section analysed and discussed the results from the quantitative data collection method, a questionnaire, which was used in this study. This section will provide the discussion of the themes that were found during the interviews held with students after each cycle. The discussion is supported with literature from chapter 2 and the researcher's own observations during the class.

The section starts with a discussion of the students' perceptions of the traditional classroom and blended learning approaches. Following that, the themes that was identified for the flipped classroom will be discussed.

4.4.3.1 Traditional classroom

Most universities in South Africa makes use of the traditional transmission mode of delivery method. This method is characterised by surface learning, passive rote learning and is considered to be teacher-centred (Betihavas, et al., 2016). The following are two examples of how students perceived this type of class during the first cycle.

My experience with the traditional one, it is a bit less interactive which is you just go to class and then listen to whatever is presented in class, which is according to whatever the lecturer is presenting and you have to accept that (student 1)

I think I enjoy the traditional way because I know exactly how things is gonna be and it is something that I am familiar with and I have studied before so it is very much like systematic. You don't have to think about it (student 2)

So, what I mean traditional learning active learning doesn't exactly happen because the lecturers give everything to you. (student 2)

I can write all the lecturer says like I make notes for what the lecturer says is important for the test and exam in different colours as she is speaking. (student 3)

To me honestly I find traditional method good as a starting point because you have the lecturer who has expertise to answer your questions and to expand on your examples. (student 4)

These examples highlight the passive nature of the traditional classroom. While students are familiar with this type of learning, and thus more comfortable in a traditional classroom, they are not actively involved with learning and do not feel that they have to take responsibility for their own learning. Instead, they absorb the knowledge of the lecturer and accept it as the truth. This does not promote higher order learning and engagement with the material.



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As can be seen in the third quote, surface learning is encouraged. Students have become strategic in what they decide to learn and 'scope for the test/exam' has become their number one question in any course. Before they have even opened a textbook, they want to know which sections will be important and which can be ignored. The problem with this type of thinking is that the sections that 'can be ignored' are often crucial for the understanding of the other sections. The worst type of surface learning is demonstrated by students that only study the previous examination papers and hope to pass with this meagre knowledge.

The traditional transmission mode is the most popular form of teaching method in both secondary and tertiary education. However, while students admitted to be comfortable with this teaching pedagogy, it consistently scored the lowest percentages in the previous section across all categories. Millennial students are exposed to technology from a young age and expect it to be part of their learning experience (Wilson & Gerber, 2008). The results in the previous section showed that students enjoyed their classes much more when technology was incorporated into

the classroom. Lecturers must thus learn how to successfully incorporate technology into their own teaching pedagogy making use of either blended teaching or a flipped classroom. The next section will discuss blended learning.

4.4.3.1 Blended learning

“Blended learning comprises face-to-face learning and teaching experiences that are combined with online tasks and activities (Graham, 2006, p. 2). Blended learning has recently become more popular in higher education as it provides an economical and convenient way for students to access their course content (Garrison & Vaughan, 2008). The students had the following opinions of blended learning which was used during cycle 2.

Blended gives you another person's perspective or maybe a clearer way of understanding the things that you have done with the lecturer in class (student 2)

It's nice that there were other people's comments that was more interactive rather than sitting on my own reading through a chunk of text (student 4)

There are some with terminology we cannot know, so with the you tube you can quickly open another tab and research what you do not know and move on with listening while you have understood everything in real time by searching

With the YouTube video, if you miss something you can go and watch it again before exam, you can re-watch the videos, while you can't have the video of your lecturer talking (student 5)

Students understood that blended learning is a combination of face-to-face and online delivery methods of content. As can be seen from the results from the previous section, the majority of students (97,5%) enjoyed the additional information they received with the online activities as they felt that it had provided a new perspective that was useful in understanding the database concepts.

Literature has shown that the blended learning approach has several advantages including improved learning outcomes (Bonk & Graham, 2006) and increased student motivation and satisfaction (Fulkerth, 2010). Students found the use of technology to be a very useful learning tool as they could access the resources

outside of class time at their convenience. The YouTube videos that were used provided additional content to explain difficult concepts, discussion points for class and were accessible 24 hours of a seven day week (24/7). Furthermore, students could make use of the Internet to clarify concepts that they had not understand while watching the video. In the classroom, some students might have been too shy to ask questions in this regard and thus did not understand the work presented. In the previous section, the results for learning strategies showed the biggest improvement in Cycle 2, which represented the blended learning approach. While students viewed both the blended learning and flipped classroom approaches favourably, they might have preferred the blended classroom approach.

However, the blended learning approach also has disadvantages as can be seen from the quote below.

It's very easy on the net to get completely side tracked and to go into things that don't necessarily relate to the course material and that may not be relevant towards the degree



One of the biggest challenges for any e-learning activity for the lecturer is to find suitable content for the curriculum. If the student is not guided in this regard, they may suffer from 'information overload', which is not conducive to reaching learning outcomes. The next section will discuss the different themes that were identified for the flipped classroom approach.

4.4.3.2 Flipped classroom approach

The categories that were used in the descriptive statistics section were used to identify the main themes for this section while sub-themes are present within each of these main themes. These themes include communication with peers and the lecturer, learning strategies, technical assistance and the overall perception of the various pedagogies.

4.4.3.2.1 Communication theme

The flipped classroom makes use of a student-centred approach where communication and interaction between students and the lecturer is encouraged (Bergman & Sams, 2012). However, not all students enjoy group activities or communicating with their lecturer. The first issue that needs to be addressed in this regard is the perceptions of the students as to what factors will limit this interaction.

4.4.3.2.2 Student confidence barrier

The following is a quote from a student that reflect the first barrier to communication in class.

My view is that I think it (communicating) differs with the personality of a person. You know, she (student 2), doesn't have any problem to say I need clarity on this and this in class. Most of the other students are afraid of asking question in class, they will feel more comfortable on the internet when they don't know something. I will not feel embarrassed when looking for answers on the internet. Student 6

With the traditional approach, students may be shy to ask questions in front of the whole class if they think that their peers may judge them. In the age of technology, it is possible for students to access the information they need to clarify the problem themselves on the Internet. However, the flipped classroom allows the students to work in small groups where they can learn from each other. The lecturer can also spend more time with students that require individual attention (Bergman & Sams, 2012). It is important for the lecturer to remember that not all students are comfortable speaking to them and that it may take time to build the trust that is needed to encourage communication.



4.4.3.2.3 Language barrier

The language barrier that exist in higher education is reflected in the following quote.

There is a language barrier because before you even ask a question you have to ask it in you mind to see if it is proper, so the confidence will interfere and then you will doubt yourself to articulate it. Student 1

English has become the dialect for scientific commutation which has facilitated the integration of research, the increasing international labour market for both scholars and scientists, multinational and technology publishing and the use of information technology (Altbach & Knight, 2007). In this model, English proficiency is viewed as a skill that needs to be learnt and then can be applied in varying contexts or fields of study (Lea & Street, 1998). However, most of the students at the university as well as the researcher, uses English as their second language. The flipped classroom provides the student with the opportunity to practise their academic literacy within the confines of the discipline until they become confident and the discourse becomes natural.

4.4.3.2.4 Competition among students barrier

Information sharing is one of the cornerstones of the flipped classroom. The following quotes are students' opinions as to how competition among students will become a barrier to share information.

I think that's a personality thing because other people will withhold information because they see other people as competition. Student 5

It an actual thing that occurs within the class like if people think that someone else is doing well, they will not help the person because they assume you should be helping others instead. So there is competition within sharing information. Student 2

Students can become competitive amongst each other. The lecturer must be aware of this when allocating group activities and monitor the progress of each group carefully. Every student should come prepared to the class and be willing to share their solutions with the group in order to benefit their fellow students (Roehl, Reddy, & Shannon, 2013). There are also benefits when communication is encouraged in the classroom. The next section will discuss these benefits.



4.4.3.2.5 Benefits of communication

There are several advantages of the increased interaction among the students themselves and the students and lectures as can be seen from the quotes below.

She (the lecturer) can answer questions much more quickly. Student 3

We like to work with each other because it's less work. Student 2

Its also more fun if you work with people. Student 2

The results in the previous section discussed how the perception of communication between peers and with the lecturer increased during the 3 cycles. Students were very positive about the increased communication between themselves, especially during the last cycle, as well as with the lecturer. The reasons for the positive perceptions include problem solving with the lecturer, and enjoyment on the part of the students as learning becomes more efficient and fun. The next section will discuss the learning strategy theme and sub-themes.

4.4.3.3 Learning strategies theme

This theme consists of 3 sub-themes. These themes are preparation for class, information overload and practical application.

4.4.3.3.1 Preparation for class

The following are reflections of students regarding the preparation that is required prior the class time in the flipped classroom approach.

For example, those worksheet no one did them. Like there were maybe five of us, that actually done the worksheet beforehand, watch the youtube videos before hand, so it wasn't as effective. Student 2

It's laziness because the worksheets are not for marks. Student 1

The flipped classroom is a student-centred approach to learning. In order to facilitate learning, each student must prepare before class so that they can participate and engage in the class discussion (McLaughlin et al, 2014). The quotes above illustrate the point that students are not willing to engage in tasks that are not assessed. If there are no immediate benefit for the student, the tasks is not considered important. The lecturer must find ways to encourage the students to prepare prior to class or their fellow students will not benefit from their participation in class.

4.4.3.3.2 Information overload

The following is a student's reflection on the amount of information that is available on the Internet.

There's a lot of information out there and if you just left on your own what about other classes that you need to prepare for? There's also lot of incorrect information out there and so we need a guided situation, for example she give us the YouTube video we should watch and the slides that we should read. This is a lot more helpful because we know that the information is relevant and accurate. Student 6

Bergman and Sams (2012B) provides 10 core learning principles that is needed when designing a flipped classroom. Principle 4 states that all learners must learn the core concepts, but not necessarily the all the course content. The learners can use any resource that is available on the Internet and it becomes the lecturers responsibility to guide students to find these resources. Many lecturers have complained that the amount of resources on the Internet has increased at such a

rate that the initial preparation for classes has become cumbersome (McLaughlin et al, 2014). However, as the database of content of the lecturer increases, they will be able to reuse some of this material and be able to discriminate content that is suitable for their students.

4.4.3.3.3 Practical application

The following are the reflections of the students on the practical application of the activities that were used in the flipped classroom.

With this (activities) we can actually do it on the computer and see how it works without being scared of messing up a database. Student 7

I like answering questions because it's practice to see how she (the lecturer) ask questions for exams and whether I can actually answer them or not. Student 8

Students can follow the course content at their own pace while the lecturer can personalise the learning outcomes for individual students. The students are also able to work through the basic concepts of SQL before coming to class, where examples that are more difficult are provided. This allows the student to experiment and ask questions in class if they do not understand something specific. Previously, the student would sit through theoretical content and practise afterwards when the lecturer is not available to answer questions. The learning outcomes thus increases and the student is more confident when making use of the technology. This is supported by the descriptive statistics that were provided in the previous section, which found that the three most important factors that influenced the learning strategies of students are the availability of content, evaluation methods making use of class exercises and assignments and the students' ability to search for information to understand the content of the course. The next section will discuss the technical assistance that students require to make use of technology in the classroom.

4.4.3.4 Technical assistance theme

The following are a student's reflection on the technical issues he faces when making use of technology in the classroom.

I'm not good in computer skills because even while I'm doing Information Systems courses, my degree is BCom Economics. I'm doing courses such as Business Analysis and Databases, so I have to force myself to learn the computer skills. I

blame my background, where I from. I am from Idyutcha. I was first introduced to computers in 2014, so my computer skill is now improving because I'm always working with computers. Student 5

The descriptive results in the previous section suggested that the students needed the most technical assistance during the blended learning cycle of the project. While the students still required more technical assistance during the flipped classroom cycle when compared to the traditional classroom cycle, it was significantly less than the previous cycle. The lecturer needs to take into consideration that not all students are computer literate and must make appropriate resources available to students that require additional assistance.

4.4.3.5 Overall perceptions theme

The descriptive results indicated that students did enjoy the blended learning approach the most, but was more likely to take a flipped classroom class in the future. The following quote reflects this trend.

I think I prefer blended learning because like we still have a high amount of lecturer input and I think if you want to learn solemnly over slides and interacting with peers and things like that you can go to places like Unisa. Student 5

Students were positive about both the blended and flipped classroom approaches, while both were more likely to consider for future classes than the traditional classroom approach. Students have indicated before that they enjoy using technology in the classroom. Lecturers should take note of this preference and endeavour to include technology meaningfully in their teaching pedagogy.

4.5 Summary

This research study investigate what are students' perceived experiences of a flipped classroom at a traditional South African university in comparison to the traditional classroom. The results were discussed making use of 4 main headings which included communication with peers and the lecturer, learning strategies, technical assistance and the overall perception of the various pedagogies. Students reported favourable perceptions for both the blended and flipped classroom learning strategies.

The research question that was under investigation in this study was asked and responded to in this chapter by means of semi-structured interviews. The themes that emerged from this study were matched analysed and discussed.



Chapter 5: Discussion of findings recommendations and conclusion

5.1 Introduction

Chapter 4 presented the data that was collected, both quantitative and quantitative, after which it was presented and analysed. This chapter starts with a discussion of the main findings, followed by the recommendations for future practice and research. These recommendations provide insight into the findings of the research that can be used to increase the implementation of the flipped classroom in higher education. The chapter concludes by citing the main limitations of the study.

5.2 Summary of main findings

The purpose of the study was to explore students' perceived experiences of a flipped classroom at a traditional South African university in comparison to the traditional classroom.



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Restatement of the research objectives

- To determine which one, if any, of these approaches are perceived or experienced to promote a more positive experience for students.
- To determine the perceived barriers (challenges) that might influence students' experiences of a flipped classroom at a traditional university in South Africa?
- To determine how the perceived barriers (challenges) that will influence the students' experience of the flipped classroom at a traditional university in South Africa could be mitigated?

A pragmatic approach was found to be appropriate for this study as the human perspective, from the point of the students, were necessary to explore the implementation of the flipped classroom in the traditional university. The students

were asked to reflect and interpret their perceptions of the flipped classroom making use of a mixed method, exploratory research design approach. Both quantitative data, in the form of a questionnaire that the students completed, and qualitative data including focus groups, field notes and observations, were collected and analysed making use of thematic analysis. The research design used in this study was action research in order to change the teaching method from the traditional lecture method to a flipped classroom method. The study was divided into three cycles. The first cycle involved 4 weeks of traditional lectures, the second cycle of 4 weeks introduced blended learning into the course, while the third cycle of 4 weeks changed the content delivery method to a flipped classroom.

The study population for the research was 130 students registered for a semester module. After each of the 3 cycles, the students were asked to complete a questionnaire that investigated their perceptions of the teaching method. The research also collected data from a focus group after each cycle was completed. Field notes and observations from the lecturer were also used to keep a detailed account of the researcher's planning, execution and reflection of each cycle. The rest of the section will discuss the findings of the first sub-questions that were presented in the preceding chapters. The third sub-question will be discussed in section 5.3.

5.2.1 Which one, if any of these approaches are perceived to promote a more positive experience?

Literature suggests that students enjoy the flipped classroom pedagogy and that it has had a positive impact on learning outcomes (Herreid & Schiller, 2013; Bergman & Sams, 2012). This is supported by the findings of this study where more than eighty percent of the students indicated that they would in future enroll for a class that makes use of the flipped classroom approach. This view is affirmed by Baepler, Walker & Driessen (2014) who assert that flipped classrooms are an appealing form of learning to prospective students. Prober & Khan (2013) concur with this view when stating that students may favour the flipped classroom more than the traditional lecture format. Fisher's et al. (2014) findings suggest that students might appreciate a flipped classroom approach more due to its flexibility, engagement and satisfaction. Moreover, the flipped classroom has been found to be very effective and

increase academic performance in especially practice-based disciplines (McLaughlin et al., 2014; Wong et al., 2014; Sharma, Lau, Doherty & Harbutt, 2015).

The flipped classroom allows the lecturer to make use of a learner-centred paradigm where students become active learners while class time is used for personalized instruction. This statement is congruent with the views of Chen, Wang, Kinshuk & Chen (2014) who state that the moving of students' passive learning activities out of the classroom allows for subsequent class time to be used for further collaborative exploration of the instructional material and shifts the focus of attention from the teacher to the student. Herreid & Schiller (2013) supports this view when stating that flipped classrooms allow students to engage in active learning tasks and activities instead of passive learning. According to Bloom's taxonomy, lower order activities, such as remembering and understanding is done prior to the class, thus the time in class can be spent on higher order activities such as critical thinking and problem solving making use of real-world scenarios (Bergman & Sams, 2012; Abeysekera & Dawson, 2015; Bergman & Sams, 2012b). The lecturer is also able to personalise the learning outcomes for individual students according to their level of understanding. Students that are struggling with the subject content can be given more foundational exercises, while stronger students can continue with more difficult problems. This allows for a deeper learning experience as students have a more comprehensive and thorough understanding of the content (Roehl, Reddy & Shannon, 2013; Herreid & Schiller, 2013).

As indicated above, the time in class are used to solve higher order problems. This activity typically makes use of group work. The use of group work in the classroom has contributed to the increased communication between students and the lecturer, which allows the student to build relationships with their peers and lecturers in order to use the zone of proximal development to increase their learning experience. This study found that students had a positive perception of both categories (student-to-student and student-to-lecturer) of communication. Students were very positive about the increased communication between themselves, especially during the last cycle, as well as with the lecturer. The reasons for the positive perceptions include problem solving with the lecturer, and enjoyment on the part of the students as

learning becomes more efficient and fun. However, the students also indicated that communication was the least important factor that would influenced their learning strategies.

Technology is used to facilitate active learning on the part of the student especially to help in preparation for the class. The flexibility of this learning method means that students can learn at their own pace as learning material is available 24/7. Students in this study also indicated that they are able to search for information to better understand and apply the course content. Typically, this increases the interest and engagement with the learning material (Bergman & Sams, 2012; Roehl, Reddy & Shannon, 2013).

Students indicated that the availability and access to content was the most important factor that influenced their learning strategies during the three cycles. Students that miss a class can also catch up more easily while the impact of the extended periods where students stay away from class, e.g. #feesmustfall, is minimized as students can continue to engage with the learning material as long as they have access to a computer. Where Internet access is not available or feasible due to high data costs, resources can be made available on the learner management system or university network for students to copy onto storage devices and can be watched at a later stage. The availability of the content has also meant that learning can take place amongst a wider audience. Some studies have reported that the resources used in the flipped classroom can be used to increase learning at rural or under resourced schools.

As part of the Activity Theory, the *tools* in this study relate to: learning strategies adopted by students, language and communication used in the lecture room, assignments and ICT tools (computers). Based on this theory, computer-supported collaborative learning is key to promote student interaction and collaborative group activities, which encourage students to ask questions, explaining and justifying opinions and reasoning are key to promote student interaction.

5.2.2 What are the perceived barriers (challenges) that might influence students' experience of the flipped classroom at a traditional university in South Africa?

Despite the advantages of the flipped classroom that were discussed in the previous section, barriers were also identified that would influence the perceptions of students when this learning approach is implemented. Baepler, Walker and Driessen (2014) state that students that dislike group learning activities will not enjoy the flipped classroom. Strayer (2012) maintains that some students fear group discussions and problem-solving activities as they regard these activities with unsettled and chaotic classroom environments in which they feel lost. They are used to the traditional lecture model and expect to passively absorb knowledge. The flipped classroom by nature expects the student to be active and prepare before the class, which is seen as an increased workload. As expected, the students indicated that the flipped classroom required more effort from them than the traditional classroom. Similarly, students who did not prepare prior to class would not enjoy the flipped classroom as they would not be able to contribute to the activities in class. It is in this sense that Roach (2014) and Suleman (2016) state that students accustomed to traditional didactical lectures may similarly resist the concept of flipped classrooms, because the onus of learning will have shifted to them, thus they perceive the workload to be rigorous. According to Talbert (2014), students perceive this increased responsibility for their own learning associated with the flipped classroom as a way of teaching themselves, due to limited didactic lectures and the learning of fundamental content on their own without considerable guidance from instructors. Their peers may also become agitated if they find that certain students are not able to participate in the group discussions, or simply 'hide' their lack of preparation by agreeing with group answers, which then decrease the effectiveness of the approach (McLaughlin, et al., 2014). Students stated that they are not willing to engage in tasks that are not assessed. If there are no immediate benefits for them, the task is not considered important. Supporting these findings, the students in this study perceived that one of the most important factors that influenced their learning strategies was the evaluation that was done, making use of class exercises and assignments. The responsibility of making sure students were prepared for class thus became the lecturers' problem,

as the students possibly did not feel comfortable holding their peers accountable for their lack of preparation.

Communication was discussed in the previous section as an advantage of the flipped classroom. While the students were positive about the increased communication in the flipped classroom, lecturers also had to be prepared for this change in the classroom. Previously, the lecturer had experienced very little interaction with the students during class as they would typically have lectured the content. With the new approach, they needed to be able to answer students' questions in class and more importantly, be able to identify misconceptions in order to correct these quickly (Berrett, 2012). Not all lecturers would feel comfortable with this new method of teaching at first.

Students also indicated that there were three barriers that related to communication that could influence the implementation of the flipped classroom. The first was that the majority of students did not use English as their first language. When a new subject was first undertaken, there was a host of new terminology that needed to be learned and remembered by the student. This contributed to the difficulty in communicating their problems to their peers or the lecturer. The second barrier was that the students might be shy to ask questions in front of the whole class or even in their small groups if they thought their peers might judge them. Lastly, students also reported that there was much competition amongst themselves in class and that some were not willing to share their answers with the group. They felt that there was a perception that the strong students should share their work, instead of every student coming prepared to the class and being willing to share their solutions with the group in order to benefit their fellow students.

When introducing technology into teaching and learning, the lecturer must make sure that the students have the available technical assistance to assist them in their learning endeavours. The technology itself can become a barrier to the implementation of the flipped classroom which is supported by the findings of this study that indicated that the availability and access to the technology and content is one of the most important factors that will impact their learning strategies. The lecturer needs to take into consideration that not all students are computer literate and must make appropriate resources available to students that require additional

assistance. Many students reported that the resources of quizzes were not available long enough before class, leaving them with limited time to complete their preparation. Students also complained that they did not have Internet access at home, and that they could only access the resources at the university. There are limited computer laboratories available at the university, and during peak times, there may not be any computers available. The students perceived that their need for technical assistance and the availability of technical resources increased during the blended and flipped classroom cycles as compared to the traditional classroom.

Although not the focus of this study, there are also barriers that prevent lecturers from implementing the flipped classroom. According to Goldberg and LaMagna (2012) some faculty members are reluctant to adopt flipped classroom strategies for a variety of reasons. The first barrier is awareness of the principles of the flipped classroom and education on how to implement these principles, including technology, in the classroom. Many lecturers still make use of the traditional classroom lectures, and do not know how to use technology meaningfully in the classroom. Rotellar and Cain (2016) assert that most faculty members did not experience this type of teaching as a student and have difficulty comprehending what they will do during class time and fear they will be unable to deliver the material adequately, especially to large enrolment classes. Lecturers also complain about the initial preparation as their workload will increase as they have to prepare the content for the class. The amount of content on the Internet is also overwhelming, and it can take the lecturers many hours to sift through the available options in order to choose the best resources for their class needs (McLaughlin, et al, 2014). In support of this statement, the students in the study did consider it the responsibility of the lecturer to guide them to the correct resources. The students felt that they could easily be side tracked if they were expected to find their own resources on the Internet. However, the workload was expected to decrease as the resources could be re-used in future courses.

The flipped classroom is a new teaching approach, meaning that there is very little objective evidence available to show the improvement in learning outcomes (Fautch, 2015). Most research, including this study, makes use of student perceptions to evaluate the teaching approach. This is due to the difficulty of objectively comparing

learning outcomes amongst the same group of students in one subject or module. Due to time constraints, it is not feasible to conduct experiments with the same class.

5.2.3 How might the perceived barriers (challenges) that will influence students' perceived experiences of a flipped classroom be mitigated?

This section answers the third sub-question that was asked in section 1.4.1 and provide the recommendations on how the barriers introduced in the previous section can be mitigated.

- In order to prepare students for the flipped classroom approach, they must be involved in the process. This means that the lecturer needs to communicate the changes and expectation of the new learning strategy at the start of the semester. The students must also be given opportunities during the semester to evaluate the approach and their feedback must be implemented. It is also a good idea for the lecturer to have an open door policy for students to communicate problems directly or a class champion that can discuss the class problems on the students behalf if they are too shy to approach the lecturer directly.
- The lecturer must hold the students accountable for preparing prior to class in order to effectively use the time during class. There are two ways of doing this: Highly structured pre-class assignments which are geared towards introducing the students with the new theoretical concepts and question and answer sessions or in class quizzes at the beginning of the class to assess the individual student knowledge gaps. These quizzes can also be included in the semester mark in order for students to take them seriously.
- Student must be given the opportunity to practice their communication skills in order to become confident in the subject matter. Where appropriate, the students should be encouraged to help each other express their queries in order to become more proficient in academic literacy.
- The lecturer should be aware of competition amongst the students. While this is not something that should be discouraged, the situation must be monitored to make sure that the competitiveness amongst students are not to the detriment of the class or weaker students.



- Lecturers must take responsibility to learn and be more aware of the flipped classroom teaching approach. They must be educated on how to introduce technology into the classroom in a meaningful way and should contribute to the body of knowledge by means of conducting and publishing on the subject matter.
- The university should encourage a round table amongst lecturers where resources and problems can be shared. This will alleviate the workload of the lecturer that can learn how to solve specific problems from colleagues while useful Internet resources can be shared or put in a database.
- Technical assistance and availability must be monitored by the lecturer. Where needed, computer literacy classes need to be provided to students that are struggling to access resources. To counter the high cost of the Internet, resources can be made available on the learner management system or university network. The resources can be copied onto a storage device and access offline at a later stage.

5.3 Recommendations for future research

The purpose of the research was to determine what are students' perceived experiences of a flipped classroom at a traditional South African university in comparison to the traditional classroom. The study identified various barriers that is influencing the implementation of the traditional classroom from the students' perspective, however, the voice of the lecturers in terms their experience with the flipped classroom still needs to be explored. A further area for future research that were identified in this study is the lack of quantitative measures to determine the effectiveness of the flipped classroom. While student perceptions can be used to determine the popularity of the pedagogy, there still need to be more objective measures to determine if the flipped classroom leads to better learning outcomes and throughput rates.

5.4 Limitation of the study

The limitations of the study included that the study was not generisable because the study population was specific to one course at a traditional university. The qualitative nature of the study, where students were asked to report their perceptions, could also introduce recall or performance bias into the study. Lastly, the occurrence of the #Feesmustfall protests during the last cycle meant that the

sample of students that completed the last questionnaire were fewer in number than those during the first two cycles, which could also introduce bias into the study results.

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