

**Contextualisation of Instructional Time utilising Mobile Social  
Networks for Learning Efficiency:**

**A Participatory Action Research Study for Technical Vocational Education  
and Training Learners in South Africa**

by

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### Declaration

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## **Dedication**

I dedicate this work to my late father, Simon Dzvapatsva. Rest in peace.

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## **Abstract**

Despite the fact that some studies have shown a connection between learning efficiency and instructional time, there is limited research carried out within the Technical Vocational Education and Training sector with a particular focus on National Certificate Vocational programmes. To fill this gap, the current study utilised WhatsApp, an instance of a Mobile Social Network, in extending instructional time beyond the normal lecturing timetables with the objective of improving learning efficiency for learners studying Computer Programming as a subject.

To achieve the research objective, a participatory action research project was carried out following a pragmatic approach, collecting qualitative and quantitative data concurrently in three phases using semi-structured interviews, questionnaire and documents. Thematic and statistical approaches were used to analyse the data collected from five colleges in the Western Cape Province of South Africa.

The findings of the study highlighted multiple issues: Firstly, awareness of instructional time phenomena was minimal from the lecturers and the learners. Secondly, there were no formal interventions in place to recover or extend instructional time beyond the traditional college boundaries. In overall, the implementation of WhatsApp to extend instructional time was accepted at the five locations. However, statistical results from the five locations after implementation of WhatsApp intervention opposed each other. Test results indicated an overall pass rate of 69.2% (n=54) of the total number of learners (N=78) who sat for the final examination. While the pass rate at each of the other four locations was above 50%, the pass rate of the fifth location was considerably low (37%).

The study generated three contributions to the body of knowledge: practical, theoretical and methodological. Firstly, through the study, practical interventions were generated to assist learners outside the classrooms. Secondly, the study generated propositions and an integrated Mobile Social Network framework that is expected to be a useful course of action for lecturers who want to improve learning efficiency through extending instructional time. A key methodological contribution has been the application of mixed methods choices in the collection, analyses of data and interpretation of results.

## **Keywords**

Competency

Instructional time

Knowledge

Learner efficiency

Mobile Social Networks (MSN)

Skill

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## **Abbreviations**

ADHD	- Attention Deficit Hyperactivity Disorder
FET	- Further Education and Training
GET	- General Education and Training
HEI	- Higher Education Institutions
HEQC	- Higher Education Quality Committee
IT	- Information Technology
ITS	- Information Technology Services
MIM	- Mobile Instant Message
MSN	- Mobile Social Networks
NATED	- National Technical Education Diploma
NCV	- National Certificate Vocational
NQF	- National Qualifications Framework
OSN	- Online Social Networks
SETA	- Sector Education Training and Authorities
SAQA	- South African Quality Assurance
TVET	- Technical Vocational Education and Training
WIL	- Work Integrated Learning
ZAD	- Zone of Actual Development
ZPD	- Zone of Proximal Development

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# **CHAPTER ONE: INTRODUCTION AND BACKGROUND**

## **1.0 Introduction**

The current chapter introduces a synopsis of learning efficiency issues and instructional time challenges within the Technical and Vocational Education and Training sector in South Africa. This is done to position the current problem which was the motivation of the study. There have been some studies focusing on TVET issues and technology-mediated interventions, however, there is a lack of studies concentrating on extending instructional time as a potential to improve learning efficiency. In addition, there has been a lack of a prescriptive framework that guide lecturers who adopt Mobile Social Network applications like WhatsApp in an attempt to improve learning efficiency.

## **1.1 Background of the study**

This study explores the effectiveness of extending instructional time beyond the traditional classrooms in an attempt to improve learning efficiency among National Certificate Vocational (NCV) learners studying the Computer Programming subject in South Africa. The study was motivated by a low pass rate for the mentioned subject and purported links to the skills shortage in the Information Technology (IT) industry. The current study, however, suggests that instructional time deserves equal attention in the context of NCV issues. A study by Bloom (1974) proposes the usefulness of instructional time in learning. There is, therefore, a possibility that extending instructional time may potentially assist in addressing learning efficiency. While it is recognised that addressing instructional time is a complex area since it requires a number of concerned parties, the current study adopts the Mobile Social Network (MSN) application of WhatsApp to lessen challenges associated with learning time shortages. Given their mobility affordances (Mao, Jiang, Min, Leng, Jin & Yang, 2016) and other benefits such as immediacy of feedback (Spencer & Hiltz, 2003) and activation of muted voices (Kukulska-Hulme, 2005; Koole, 2009; Bere & Rambe, 2016), MSN can potentially be used to deal with instructional time challenges, if administered under the guidance of a lecturer.

The reviewed literature (Rambe & Bere, 2013; Roodt, de Villiers, Johnston, Ophoff & Peier, 2014; So, 2016) on innovation use in instructional delivery, however, does not place emphasis on instructional time. Other researchers (Carroll, 1963; Bloom, 1974, Stallings, 1980; Fredrick & Walberg, 1980; Caldwell, Huitt & Graeber, 1982, Gandara, 2000; Rivkin & Schiman, 2015) suggested a connection between instructional time and learning efficiency. Nonetheless, not all

of the studies agree conclusively that instructional time is influential in determining learning efficiency. Other studies (Karweit, 1985; Gettinger, 1989) place more emphasis on quality of instruction, culture, affective entry behaviours and cognitive entry behaviours. Subsequently, the concept of instructional time remains less considered as a potential challenge towards improving learning efficiency.

In the context of TVET, the more frequent challenges identified include funding (McGrath & Akoojee, 2009), poor relationships between labour markets and the programmes (Cloete, 2009; Gewer, 2009), articulation issues (Akoojee, 2009) and mismatch of learners and programmes (Papier, 2009) when dealing with learning efficiency. According to Paterson (2016), the South African TVET sector is regarded as underperforming yet is expected to respond directly to the skills shortages and skills mismatch, and to reduce poverty by producing knowledgeable, competent and skilled graduates who can be easily accepted by the industry. Although absorption into the labour market may not only require graduates to be competent, skilled and knowledgeable, but also strong social networks (Gewer, 2009). Nonetheless, it is also possible that efficient learners stand a better chance once opportunities become available. Moreover, efficient learners allow countries to spend less on training and human capital development since competency is potentially attained within the prescribed time.

In the wake of globalisation, the TVET sector has emerged in most countries as a key solution for addressing skills shortage, economic growth and poverty alleviation (Akoojee, 2009; Palmer, 2014; Yi, Zhang, Yao, Wang, Ma, Shi, Chu, Loyalka & Rozelle, 2015). However, despite various initiatives towards its success in different countries, the TVET sector still experiences learner efficiency challenges probably emanating from, among others, utilisation of instructional time. A possible remedy in that regard would be looking at initiatives that assist in extending instructional time.

Practical solutions with a direct positive impact on learning processes are required to address learning efficiency because society requires an intermediate and high-level skilled labour force that TVET colleges are supposed to produce. In that context, the current study used MSN to extend instructional time with the hope of recovering lost time and extending learning beyond traditional classrooms. Traxler (2009) highlights that mobile learning offers ‘just in time’ demands of twenty-first century learners”. Notwithstanding the challenges associated with MSN platforms such as availability, privacy and security (Kayastha, Niyato, Wang & Hossain, 2011;

Song, Niyato, Han & Hossain, 2015) and others, this study suggests that using applications such as WhatsApp perhaps suits 21<sup>st</sup> century learners.

The current study investigated the use of Mobile Social Networks in dealing with the instructional time discourse that may contribute to learning efficiency issues within the TVET sector in developing countries. A three-cycle Participatory Action Research (PAR) was carried out, collecting relevant qualitative and quantitative data from five TVET Colleges situated in the Western Cape Province of South Africa which were also experiencing instructional time loss and learning efficiency issues.

The subsequent sections of the current chapter are presented under the following headings: problem statement (section 1.2); research question (section 1.3); rationale of the study (section 1.4), scope of the study (section 1.5); contextualisation of instructional time (section 1.6); justification of the study (section 1.7), and thesis layout (section 1.8) and conclusion (section 1.9).

## **1.2 Problem Statement**

Learner efficiency is currently a problem as reflected in the skills gap and unemployment levels in different countries (Palmer, 2014; Yi *et al.*, 2015; Papier, 2009; Akoojee, 2009). In South Africa, learning efficiency is currently a problem within the NCV programmes of Information Technology. The government of South Africa continues to come up with initiatives aimed at improving learning efficiency within the NCV. Some of the interventions includes lecturer training (Department of Higher Education and Training [DHET], 2017), availing sample examination papers, increased funding (McGrath & Akoojee, 2009), improved learner support (Papier & McBride, 2018) and many others. Statistics has consistently shown, however, that poor learning efficiency is still experienced within the NCV programmes (Papier, 2009; DHET, 2013; DHET, 2016; DHET, 2017), especially in areas such as Information Technology.

The problem of learning efficiency within the NCV is causing a multitude of problems, for instance youth unemployment (Bhorat, Cassim, Kanbur, Stanwix & Yu, 2016; Wedekind & Buthelezi, 2016); criticisms of the sector from the labour market for producing graduates not meeting their expectations (Paterson, 2016; Papier, Needham, Prinsloo & McBride, 2016) among others. In South Africa, the TVET sector continues to be viewed as a dependable solution to the skills gap, poverty alleviation (Wedekind & Buthelezi, 2016), and youth

unemployment (Wedekind & Buthelezi, 2016; Borat *et al.*, 2016) since the curriculum is purportedly geared to meet industry demands, although at times used for political mileage (McGrath & Akoojee, 2009).

Although it is controversial whether the unemployment reported in certain industries results from lack of skills or skills mismatch, the reality stands that learners are not passing their IT courses within the given period, resulting in the realisation of graduates who can be absorbed into the industry or by institutions of higher learning taking much longer. Learning efficiency issues must be dealt with in their entirety to produce knowledgeable, skilful and competent graduates who can articulate vertically or horizontally.

In some cases, the proposed solutions to address learning efficiency created further problems (Gewe, 2016) in the country. For instance, increased enrolment brought with it infrastructural challenges (Akoojee, 2009); increased funding and more autonomy on colleges has led to other governance issue (Gewe, 2016). An area that has not been tried is that of extending instructional time. Although undocumented evidence shows that certain colleges conduct extra classes during the weekends, they come at an extra cost to the learner as the transport allowance they receive from NSFAS does not cater for weekend transport. An area which could potentially resolve the issues at minimal costs would be extending instructional time through Mobile Social Networks such as WhatsApp, whereby lecturers and learners can collaborate through these platforms. Despite various sources indicating the importance of instructional time for learning outcomes, the articles reviewed in the current study on the TVET sector are silent on the probable impact of the construct. Studies have been carried out using MSN, but extending instructional time was not the prime target and the studies have also not been carried for NCV learners. An in-depth study on extending instructional time utilising MSN platforms such as WhatsApp is required to address learning efficiency to complement existing solutions from the government. This study is set to show how lecturers can address learning efficiency by extending instructional time outside the classrooms.

### 1.3 Research Question

Mindful of the problem statement, the research question was formulated as follows:

***How can instructional time be extended using Mobile Social Networks (MSN) to enhance learning efficiency of Technical Vocational Education and Training (TVET) learners?***

The objective of the main research question was: ***To contextualise the use of MSN in extending instructional time for enhancing learning efficiency.*** Through literature and analysis of data, the study aims to draw propositions and propose an integrated MSN framework.

For the purposes of answering the main research question, five sub-questions were framed and corresponding objectives listed in Table 1.1 as follows:

**Table 1. 1: Research sub-questions and corresponding research objectives**

<b><i>Research sub-questions</i></b>	<b>Research objectives</b>
1. <i>What are the key factors contributing to differences in instructional time?</i>	To understand instructional time differences within the NCV programmes To identify and explain factors which contributed to differences in instructional time
2. <i>How do the different instructional contact styles affect participation?</i>	To assess the link between different instructional contact styles between learner and lecturer
3. <i>How can MSN be used to increase instructional time?</i>	To identify how MSN can be used to increase instructional time To evaluate the relationship between instructional time and attendance.
4. <i>How can an integrated MSN framework guide TVET practitioners and policy makers in addressing instructional time issues?</i>	To propose a prescriptive MSN framework to guide TVET practitioners and policy makers in addressing instructional time
5. <i>To what extent do learners and lecturers perceive the usefulness of MSN in dealing with instructional time discourse for learning purposes?</i>	To understand perception of learners and lecturers perceive the usefulness of MSN in dealing with instructional time

### 1.4 Rationale of the study

The research arose from observations in instructional time loss within the TVET sector and learning efficiency issues. The researcher then drew up connections between the two and provided practical solutions to solve the associated challenges. First, as a lecturer in Computer Programming within the NCV Information Technology programmes in South Africa, the researcher observed instructional time disruptions at college and class levels. Instructional time

lost is difficult to recover during the normal learning time owing to the rigidity of timetables at the colleges, particularly for the TVET sector in South Africa. Despite some efforts by some colleges to regain lost time through extra classes, not all learners are able to attend these extra lessons owing to associated costs and other social issues. The study, therefore, proposed a solution of assisting learners outside the classrooms using Mobile Social Networks, but acknowledging already-noted disparities accessing technology among the learners.

Assuming that access to technology would be fairly distributed, which might not always be the case; learner engagement is likely to improve (Barczyk & Duncan 2011). The presumption that through engagement, learners can share the knowledge, rides on the constructivist learning perspective (Tam, 2000; Powell & Kalina, 2009). Fundamental to the effectiveness of engagement through technology is social interaction.

Despite improved engagement, social interaction absence may negate the benefits of technology in learning (Kreijns, Kirschner & Jochems, 2003). While literature on MSN suggested use of digital technology as an alternative for collaboration, the studies do not mention increasing instructional time as a solution but rather put emphasis on engagement and usability. MSN groups are, however, built upon social understanding between users or group members. Social interaction is fundamental within MSN groups.

Second, statistics issued by the Department of Higher Education (DHET) of South Africa indicated the NCV sector as the most affected TVET programme particularly for learners studying Information Technology (IT) (DHET, 2009; DHET, 2013; DHET, 2016). A report from the DHET highlighted that graduates are yet to “respond directly to the priority skills demands” (DHET, 2009:5) with a national certification rate of 20.7% in 2008 (DHET, 2013:38) progressing to 34.4% in 2014 (DHET, 2016:37). Although the statistics indicate an improvement of approximately 13.7% compared to the previous year, learner efficiency has not been increasing drastically to match the growing economy and population of South Africa.

Third, there has not been an integrated framework to guide practitioners and policymakers on how to extend instructional time using MSN. Although there are existing frameworks such as the Conversational framework (Laurillard, 2002), the Pedagogical framework (Park, 2011) and others, they do not explicitly mention the importance of learner-lecturer aspect within those

environments. As such, developing an integrated framework was identified as one of the key objectives of the present study.

## **1.5 Scope of the Study**

The current study focused on National Certificate Vocational (NCV) learners studying Computer Information Technology with Computer Programming as one of the core subjects. A detailed structure of TVET programmes is given in section 2.5.3. Computer Programming was chosen as it is an exit-level subject done in year three of the National Certificate Vocational programme. In addition, Papier's (2009) study listed Computer Programming as at risk subject. Statistics (DHET, 2018) also highlight the subject to be among the at-risk subjects with a very low pass rate. Furthermore, the field of programming was listed in South Africa as one of the sectors experiencing a skills shortage. Respondents of the research were from five TVET colleges situated in the Western Cape Province in South Africa. Two of the colleges are situated in a semi-rural location while the other three are in the urban area. The rationale for selecting colleges from different locations is to have a near balanced representation of the South African context. Besides the reasons mentioned for selection, previous studies on instructional time (Bloom, 1974; Abadzi, 2007, 2009) highlighted the influence of location on instructional time wastage and South Africa is not exempt from the challenges. In addition, literature (Benavot & Gad, 2004; Abadzi, 2007, 2009) has shown that a lot of instructional time, particularly allocated time is lost in developing countries, and South Africa has not been spared from the problem. It is within this context that the present study attempts to investigate the phenomenon within the context of South Africa.

## **1.6 Contextualisation of Instructional Time**

One of the important elements in teaching and learning is instructional time because there is an association between learning outcomes and utilisation of time. Literature (Bloom, 1974; Duncheon & Tierney, 2013) places emphasis on the importance of instructional time for learning purposes. Studies by Carroll (1963) laid the foundation on relationship between learning outcome and utilisation of time spent and required time. While recognising the significance of instructional time for learning purposes, it should be noted that the construct is multifaceted, making it very difficult to measure (Carroll, 1963). It remains a grey area as to which type of instructional time is more influential in predicting learning outcomes. In any case, it is not a piece of this investigation to recognise which of the various sorts of instructional time

contribute more. The current study focuses on extending instructional time beyond college times as an attempt to increase collaboration beyond classrooms.

On the other hand, other researchers (Karweit, 1983; Fredrick & Walberg, 1980) argued that even if measured accurately, instructional time might not be sufficient to predict learning outcomes. Conversely, researchers such as Duncheon and Tierney (2013) suggest a different perspective of not viewing instructional time solely as a linear construct, but also a social or virtual construct which can be availed through technology. For the reason mentioned, allocated learning time will be interrogated in this study as it forms the sum total of instructional time. Concentrating on allocated learning time is not an attempt to signify that it is the sole type of instructional time with more influence on learning outcomes, but encompasses other forms within itself.

### **1.7 Justification of the Study**

Educational initiatives require careful consideration of instructional time in order to maximise opportunities from the learning process. Bloom (1974:682) pointed that “all learning, whether done in school, or elsewhere requires time”. Similarly, Gandara (2000:2) corroborates the idea by saying “... there is a relationship between the amount of time invested in learning and the quantity and quality of learning that occurs for any given group of students”. Although instructional time may not result in total eradication of learner inefficiencies, it is expected that positive variations could result in marked improvements. Conclusive studies on educational gains through increased instructional time within TVET programmes such as the NCV in South Africa are still lacking.

Educators continue to incorporate technologies for learning purposes with the hope of addressing some learner challenges. One of the technologies introduced is Mobile Social Networks, also referred to as Mobile Instant Messaging (Rambe & Bere, 2013). Studies (Kirschener & Kaprianski, 2010; Roodt *et al.*, 2014) have demonstrated the value of informal communities in learning. Although the results can be inferred in the current study owing to their usefulness in learning, there is minimal emphasis on the instructional time aspect in relation to the technology, an argument on which this study is built.

Moreover, reviewed studies which used MSN platforms for example, Facebook, WhatsApp, and Twitter uncovered various outcomes when utilized for instructing and learning purposes.. For

instance, Rambe and Bere (2013) found positive influence in WhatsApp usage within tertiary institutions when applied for learning purposes. Contrary, Kirschener and Kaprianski (2010) reported a negative influence from use of Facebook. Other studies (Digregorio & Sobel-Lojeski, 2010) detailed mixed associations between learner performance and MSN usage. Notably, all the studies mentioned do not emphasise increasing instructional time, neither do they particularise the use for TVET learners.

Further, looking at the TVET literature for studies completed in different countries (Heikkinen, 1997; Oketch, 2007; McGrath & Akoojee, 2009; Papier, 2009; Yi *et al.*, 2015), very little has been documented focusing on contextualisation of instructional time for learning efficiency. The central themes highlighted in most of studies on TVET concentrate on the following:

- benefits of TVET (Sakellariou, 2006),
- vocational discourse (Lewis, 2009),
- influence of Western paradigms and associated funding (McGrath & Akoojee, 2009; Watson, 1994), gap between education and labour market needs (Gewer, 2009; Hasanefendic, Heitor & Horta, 2016),
- financial support (McGrath & Akoojee, 2009), reduction in fees (Yi *et al.*, 2015) and increased support, and
- performance as well as addressing economic and social injustices (Papier, 2009; Akoojee, 2009; Yi *et al.*, 2015).

There is a possibility that some of the above-mentioned TVET issues, such as performance, (in South Africa) may be linked directly or indirectly to instructional time discourse.

The present study, therefore, seeks to highlight the complementary nature of Mobile Social Network tools in dealing with instructional time discourse. As highlighted in earlier research (Bloom, 1974; Stallings, 1980; Caldwell *et al.*, 1982), a key aspect in learning is instructional time and not simply engagement. Placing more emphasis on engagement alone in the learning process is insufficient, but rather spending “time in activities that teach the prescribed curriculum” (Abadzi 2009:275). Nonetheless, time is a social construct and without engagement, instructional time may be negatively impacted upon, hence the use of WhatsApp group interventions, which are more popular for collaboration purposes. Moreover, research (Clark, Nguyen & Sweller, 2011; Bicen, Sadıkoğlu & Sadıkoğlu, 2015) has shown that

instructional environments that are technology-mediated produce higher outcomes with less mental effort. The study seeks to add practical, methodological and theoretical contributions.

## **1.8 Thesis Layout**

**Chapter One: Introduction** — provides a brief understanding of the problem.

**Chapter Two: Literature Review** — provides associated literature with regards to instructional time, Technical Vocational Education, learning efficiency and Mobile Social Networks.

**Chapter Three: Conceptual Framework** — outlines the hypothetical foundations of the study.

**Chapter Four: Research Design and Data collection** — illustrates the different philosophies and adopted paradigms in the process of gathering and analysing data.

**Chapter Five: Findings** — demonstrates the research findings and analysis of the data.

**Chapter Six: Theoretical elaboration** – provides propositions and an improved Integrated MSN framework using the research findings

**Chapter Seven: Discussions** — discusses how the objectives have been met from the data collected.

**Chapter Eight: Conclusion-** — summarises the study and highlights learning points, researcher’s opinion and recommendations.

## **1.9 Conclusion**

This current chapter presented a synopsis on the inquiry by covering the following concepts: i) background of the study, ii) problem statement, iii) research question, iv) rationale of the study, v) contextualisation of instructional time, vi) justification of the study, and vii) thesis layout and conclusion. By answering the research questions, the study seeks to make practical, methodological and theoretical contributions to improving learning efficiency through extending instructional time within the TVET sector. Chapter 2 gives a detailed discussion of pertinent literature related to the study.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.0 Introduction**

Literature review positions a research argument within the context of other related studies through identifying gaps and acknowledging supporting and contradictory perspectives on the phenomena of interest. As suggested by Okoli and Schabram (2010), literature review provides a solid understanding of the concept being researched. Research reports (Webster & Watson, 2002; Rumrill, Fitzgerald & Merchant, 2010; Okoli & Schabram, 2010; Boell & Cecez-Kecmanovic, 2015) identified different literature review techniques and these include traditional or narrative, systematic, meta-analysis and meta-synthesis reviews. For the purposes of rigour, reproducibility, comprehensiveness and explicitness (Okoli & Schabram, 2010), a systematic approach was applied in this study.

### **2.1 Background on literature review**

Instructional time stands out as an essential resource contributing towards success of learners. Because learning outcomes are measured with time aspect in mind, study on instructional time becomes vital for the purposes of improving learning efficiency within the TVET sector. Literature (Bloom, 1974; Abadzi, 2009; Lavy, 2015) highlighted that learning institutions with more social, economic and political stress are likely to suffer more instructional time disruptions than their counterparts with less stress. While other researchers (Karweit, 1985; Gettinger, 1989) suggest otherwise by pointing to factors like quality of instruction, cognitive entry behaviours and others as being of paramount importance in learning, it will be argued in this research that instructional time is of great importance. Instructional time challenges affect learning and may subsequently result in learning discourse if time is not used sparingly. Sources (Carroll, 1963, Bloom, 1974; Corey, Phelps, Ball, Demonte & Harrison, 2012) have identified how learning efficiency is impacted by instructional time.

However, research on instructional time is non-coherent and marred by disagreements. While some studies (Carroll, 1963; Corey et al., 2012; Rivkin & Schiman, 2015) put emphasis on instructional time, others (Karweit, 1985; Gettinger, 1989) acknowledge the importance of instructional time, but put more emphasis on prior knowledge and quality of instruction. While trying to reveal more insight into the fragmented conclusions, the current research suggests that the contributory mind-set of instructional time can be changed using Mobile Social Networks in learning. This study suggests that contacting learners outside the classrooms potentially helps

to extend instructional time with the possibility of solving the associated challenges, for instance, learning efficiency issues.

While there are studies (Cramer & Hayes, 2010) highlighting the disruptive nature of Mobile Social Network platforms, MSN platforms like WhatsApp have the potential to allow learners to experience learning virtually without any geographical or time restrictions (Duncheon & Tierney, 2013). Nonetheless, the reviewed studies were not carried out within the TVET sector which is the focal point of the present examination.

Early studies reviewed on instructional time were carried out at schools in developed countries. Insightful as it is, it appears the literature overlooked the instructional time construct within the TVET sector, let alone developing countries. Moreover, instructional time study is not a new concept, having been highlighted several times since Joseph Mayer Rice raised the issue in the early 1800s (Rice, 1893; Thorndike, 1921, Carroll, 1963; Bloom, 1974). The majority of studies on instructional time are based on ‘model of school learning’.

A striking point from the studies reviewed in the present examination on TVET issues appear to be silence on the effect of instructional time towards learning efficiency despite considerable evidence from other studies (Gandara, 2000; Duncheon & Tierney, 2013; Rivkin & Schiman, 2015) on the construct suggesting otherwise. Instead, much of the focus from different governments, especially in developing countries, has been on increasing enrolment figures within the TVET sector in an effort to redress the imbalance created by colonialism. Whether the intervention translates to pedagogical efficiency in the wake of varying challenges such as student unrest, increased enrolments is a notion to be realised. In an attempt to improve learning efficiency through improved attendance, the South African government effected a policy where learners get travel allowances based on attendance reflective of instructional time loss awareness.

The resulting effect from instructional time loss is possibly causing TVET colleges to be regarded as underperforming (Paterson, 2016). Given instructional time disruptions caused by events like FEES MUST FALL which occurred in 2015 and other similar events during normal teaching and learning time, it seems rational to make use of tools that can be used to contact learners beyond classrooms in an effort to deal with the loss.

The rest of the literature review chapter is structured as follows: Section 2.2 gives definition of terms, followed by factors constituting learning efficiency in section 2.3, human capital theory in section 2.4, TVET sector and associated challenges in section 2.5, learning efficiency in section 2.6, instructional time in section 2.7, mobile social networks in section 2.8. Section 2.9 discusses incoherence, and incompleteness gaps in literature. Section 2.10 summarises the key concepts of instructional time, learning efficiency and MSN within TVET sector.

## **2.2 Definition of terms**

The five key terms discussed in this section of the study are: instruction, instructional time, Mobile Social Networks, learning efficiency, and Technical Vocational Education and Training (TVET).

Instructional time encompasses two key terms: instruction and time. Instruction is direction or steps detailing how learning is done (Reigeluth & Carr-Chellman, 2009), while time is used in calculating the length of events. The two key terms combined are defined in Berliner (1990:3) as "... a superordinate concept" incorporating all types of instructional time to contact learners. Similarly, in the current study, instructional time is defined as any contact time which can be used for teaching and learning purposes. Through the use of mobile devices and social networks, learning can occur from any location where there is connectivity. This study suggests that facilitators at learning institutions can take advantage of the technology to extend instructional time outside the classrooms.

Another key term is 'learning efficiency', an aspect used to evaluate whether a learner has met the requirements for the course studied. Phrases like 'learning outcomes', 'learning achievement', 'learning performance' have been used in different studies to refer to learning efficiency. According to Kolfshoten, Lukosch, Verbraeck, Valentin and de Vreede (2010:652), learning efficiency is defined as "... the speed by which novices gain skills and knowledge that enables them to start performing indistinguishable from experts". The given definition mentions knowledge and skill but excludes competence, which is the third dimension of learning efficiency in the current study. According to Bloom, Engelhart, Furst, Hill and Krathwohl (1956) knowledge, skill and attitudes are attributes closely linked to the 'cognitive', 'affective' and (later) 'psychomotor domains'. 'Cognitive dimension' describes knowledge while 'affective domain' describes the competences (social and meta-competence) and 'psychomotor' looks at the skills. For the reason stated, this study defines learning efficiency in three

dimensions: i) knowledge, ii) competence and iii) skill. There have been several competence-based studies in vocational education (Velde, 1999; Winterton, Le Deist & Stringfellow, 2005; Brockmann, Clarke, & Winch, 2008). It is argued in this study that most of the mentioned studies on competence appear to intertwine knowledge and skills under a broad term: ‘competence’. A detailed discussion on knowledge, skill and competence is therefore elaborated on in section 2.3.1-2.3.3.

The study views the three variables as the cornerstones of learning efficiency, thus cannot be dealt with in isolation of the other. The use of knowledge, skill and competence for learning efficiency adopted in this study closely resembles Winterton *et al.*’s (2005) credit transfer criteria for the purposes of evaluating outcomes.

Another key term in the current study is Mobile Social Networks (MSN). MSN is the convergence of social media and mobile learning. According to Mao *et al.* (2016:1), “a mobile social network (MSN) is a social network overlaying one or several types of mobile networks”. As observed by Kayastha *et al.* (2011), MSN is located at the central where mobile networks and social networks intersect (depicted in Figure 2.3). The availability of social network platform through mobile devices brought about the concept of Mobile Social Networks (Mao *et al.*, 2016; Peng, Yang, Cao, Yu & Xie, 2017). Synonymous with MSN applications is the capability of bringing together people sharing same purpose. Examples of MSN include WhatsApp, Facebook, Facebook Messenger, BlackBerry Messenger (BBM), Viber, Vimeo, Twitter, Instagram, Pinterest, Tumblr, Snapchat, to mention a few. In the present study, the term Mobile Social Network is used to reference social networking platforms which can be accessed through mobile devices used for communication for instance tablets and many others. The TVET sector briefly discussed in the next paragraph and later in section 2.5 is expected to benefit from use of MSN in extending instructional time.

TVET is geared towards addressing skills shortages and reducing unemployment levels by providing an alternative learning path for secondary school learners from grade ten upwards. The term TVET is defined as “a range of learning experiences which are relevant to the world of work and which may occur in variety of learning contexts, including educational institutions and the workplace”, (Oketch, 2007:224). Several researchers have used different terms like ‘vocational education’ (Benavot, 1983; Lauglo, 2010), ‘vocational training’ (Lauglo, 2010), ‘technical vocational education and training’ (Oketch, 2007; Akoojee, 2009; Powel & McGrath,

2013, Wedekind & Buthelezi, 2016). Despite the differences in terminology, a commonality which is prevalent in all cases is that “TVET comprises of training and skills development activities relating to occupational fields, production and livelihoods” (Latchem, 2017a:3). In South Africa, Further Education and Training Colleges Amendment Act No 1 of 2013 (DHET, 2013) paved the way for the term TVET from FET. The present study makes use of the term TVET as applied to the South African context particularly focusing on the NCV programmes which are not found in other countries, looking at the composition of targeted population.

The targeted population for NCV programmes were learners who successfully complete grade 9, 10, 11 and or lately Grade 12s. Section 2.5.2 provides a comprehensive description of the three TVET programmes as per South African context. TVET courses are offered by either public colleges or private colleges. The current study concentrates on public TVET colleges in South Africa where issues of instructional time loss have been experienced though not officially documented in most cases. From that notion, section 2.3 attempts to provide a literature perspective on the factors constituting learning efficiency issues.

### **2.3 Factors constituting learner efficiency**

This study adopts three dimensions namely: knowledge, skill and competence as the attributes of evaluating learner efficiency since they relate directly to learning outcomes allowing vertical and horizontal progression with potential of incorporating all forms of learning (Winterton *et al.*, 2005; Brockmann *et al.*, 2008). In an effort to allow transferability and mobility of qualifications, the European Union signed the European Qualifications Framework in 2002 to allow people from member states to be evaluated and fit in any country they migrate to. This study encapsulates attitude under competence, as discussed in section 2.3.3 despite being included under affective domain in the taxonomy (Bloom *et al.*, 1956). Against the background of the fourth Sustainable Development Goal as put forward by the United Nations, the current study views the three dimensions of knowledge, skill and competence as cornerstones to learning efficiency. To achieve learning efficiency, the three dimensions must fit together.

#### **2.3.1 Knowledge**

Knowledge is the understanding of taught or learnt concepts. According to Dooley, Lindner, Dooley and Alagaraja. (2004:317), “Knowledge is a body of information applied directly to the performance of a given activity”. With regards to TVET, nations, for example, Germany and The Netherlands advocate for knowledge within their TVET systems while other countries like

Australia and United Kingdom lean toward skill-based systems. In knowledge-based systems, learners are regarded as knowledgeable if they are able to deduce well-structured judgements from the theoretical models learnt. According to Winterton *et al.* (2005:9) knowledge “... is actually the result of an interaction between intelligence (capacity to learn) and situation (opportunity to learn), so is more socially-constructed than intelligence”. Therefore, it is suggested in the current context that social construction of learning concepts can possibly be addressed by availing content on social platforms. There is a possibility that learners can share undocumented knowledge through social interaction while others are able to apply the shared knowledge into more tangible knowledge. Nonaka and Takeuchi (1995) demonstrate how Japanese companies benefitted from transforming knowledge from tacit to explicit and the other way round in the motor vehicle and electronic industry.

Tacit knowledge is equated to understanding or know-how; situational knowledge results from experiences dealing with cases, while explicit (declarative) knowledge is equated to stored knowledge which can be apportioned or transferred effortlessly (Nonaka and Takeuchi, 1995). When using MSN for learning, the key focus is on how people share the knowledge that they have and in turn use them during formal tasks. The type of knowledge may result from shared experiences and observations from prior activities or other practices independent of language (Chatti, Klamma, Jarke & Naeve, 2007). For instance, if learners interact through MSN, they can take videos of how they accomplish a task and then share as the application allows transmission of images. The resulting knowledge when applied to programming situations becomes tangible and can be documented for future references once a programme works successfully.

Proponents of knowledge-based systems have been criticised on their over-emphasis of theoretical knowledge as foundation for the occupational field, ignoring tacit knowledge. Regardless of the criticism, TVET sectors should embrace knowledge approaches in learning and labour processes with functional competence since they are learner-centred (Brockmann *et al.*, 2008) despite the dangers of being overshadowed by employer needs. Employers do not need general skills but rather specific ones as they are more interested in competing. It is then argued that if knowledge involves interaction of intelligence and application in a situation, skill is a resultant goal, with the two dimensions believed to be fundamental requirements for competence.

### 2.3.2 Skill

Learner skill is the second attribute used in this research for evaluating learning efficiency. The Skill dimension has been identified in several studies of evaluating learning outcomes. Unlike knowledge-based systems, skill-based systems are more behaviouristic and outcome-oriented. Skill is a resulting product of training and experience (Nygaard, Højlt & Hermansen, 2008). “Skill is a present, observable competence to perform a learned psychomotor act” (Dooley *et al.*, 2004:317).

As suggested in Bloom’s taxonomy of learning, skill is situated within the psychomotor realm. As Winterton *et al.*, (2005:10) put it, “Skill is used to refer to a level of performance, in the sense of accuracy and speed in performing particular tasks (skilled performance)”. It follows that for an individual to be regarded as skilful, he/she must have met certain criteria of conduct. In other nations, for example, Australia, the United Kingdom, TVET systems follow a skill-oriented approach where standardised tests are used to measure skill, and South Africa appears to have used the same template. Arguably, a more robust approach is the holistic system to TVET followed by countries like Germany, The Netherlands and Finland.

Skills develop over time through practice and are goal-oriented, responding to demand (Proctor & Dutta, 1995). As identified in Proctor and Dutta (1995), there are four different types of skills that should result from education and training and these are: perceptual, response selection, motor, and problem solving skill. For instance, engineering employers interviewed in Papier *et al.* ‘s (2016:90) study highlighted the need for “practical, academic and attitudinal skill”. On the other hand, employers may put different emphasis of specific skill over others. Other sectors like tourism mentioned attitude, communication and call centre skills (Papier *et al.*, 2016). Although it can be argued that skills can be too broad and employer-dependent, the more common ones like attitude and communication can be well fostered through collaboration.

Proponents of skill-based systems suggest that through practice, the cognitive aspect is reduced, thus challenging the advocates of knowledge-based systems underpinned by theoretical knowledge similar to ones implemented in the German VET sector. Skill-based systems are more synonymous with narrowing skills, ignoring other domains like critical thinking, communication and ability to act. Often TVET systems that are skill-oriented respond more to specified behaviours, limiting an organisation’s capability to react to competitive advantage in an ever-changing economy and tends to position the employee in the cracks of low-paying jobs

(Winterton *et al.*, 2005; Brockmann *et al.*, 2008). In South Africa, there seems to be paradoxical call where others report on skills mismatch (McGrath & Akoojee, 2009; Wedekind & Buthelezi, 2016) while at the same time others are vocal about skills shortage (Akoojee, 2009; Gewer, 2009; McGrath & Akoojee, 2009; Towani, Buthelezi, Wedekind, 2016; Wedekind & Buthelezi, 2016). Whether shortage or mismatch, the end result is still the same: industries cannot find people to fill certain positions.

### **2.3.3 Competence**

Another key concept in learning efficiency is competence. Competence entails meeting set criteria often reflected by achievement from set standards. Svendsen (2012:60) defines “competence as the ability to use the skills” and knowledge as judged by peers to solve a given task. “Competencies establish the requirements needed to be successful in a given profession or task” (Dooley *et al.*, 2004:317).

Pate, Martin and Robertson (2003) argue that epistemological underpinnings determine how one defines competence. Several types of competence have been suggested: Outcomes, tasks and personal traits (Mansfield 2004); skill, knowledge and competence as a sub-set of competence (Dooley *et al.*, 2004); behaviouristic (Velde & Cooper, 2000; Le Deist & Winterton, 2005), generic and holistic competence (Gonczi, 1994; Hager, 1995); objective and subjective competence (Winterton *et al.*, 2005).

Competence dimension studies have been marred by controversy (Le Deist & Winterton, 2005) because humans can possess multiple attributes which determine individual performance (Hager, 2004). After all, competence is an output of judgment; therefore, it is argued that competence becomes objective rather than being subjective, depending on the judge. Research reports (Velde, 1999; Dooley *et al.*, 2004; Le Deist & Winterton, 2005) show relevance of competence-based study in training. There have been several uses of the term competence and competency in evaluating learning outcome and at times used interchangeably.

Notwithstanding the controversy associated with the competence-based education, this study adopts competence as one of the three dimensions used in evaluating learning efficiency together with knowledge and skill. Velde (1999) highlights the importance of competence dimensions in vocational education. Given the rapid changes in environment as a result of

global economy, understanding competence appear to be key for the purposes of evaluating learning goals since most of the people are always on the move.

Critics of behaviouristic approaches to competence have cited the limitation it poses to real life experiences. In addition, behaviouristic approaches to competence ignore the development of new skills that arise from the combination of tasks. As knowledge shifts from tacit to explicit and back to tacit, new forms of competence may arise. Competence can be viewed from a behaviouristic approach based on direct scrutiny and will keep transforming for the better through practice and training (Velde & Cooper, 2000). Nonetheless, viewing competence through a behaviouristic lens tends to focus more on itemised behaviours which might result in misleading conclusions. It is, therefore suggested that TVET facilitators should guide learners in developing holistic competence (Velde & Cooper, 2000).

Unlike performance, competence is not measurable. However, people use inferences to reach a conclusion and the result is in most cases open and amenable through estimation (Winterton *et al.*, 2005). Figure 2 illustrates a Knowledge, Skill and Competence typology (Winterton *et al.*, 2005) used to represent the learning outcomes to meet organisational and national goals.

	<i>occupational</i>	<i>personal</i>
<i>conceptual</i>	Cognitive competence (knowledge)	meta-competence (facilitating learning)
<i>operational</i>	Functional competence (skills)	social competence (attitudes and behaviours)

**Figure 2. 1: Unified Knowledge Skill Competence Framework**  
(Source-Winterton *et al.*, 2005:40)

The unified typology illustrates two types of competences: meta-competence and social-competence all of which are personal in nature and assessed through observation. The unified typology is similar to the multi-dimensional competence approach implemented in countries like Germany, France, The Netherlands, Austria, Hungary and Slovenia (Winterton *et al.*, 2005), unlike South Africa. The South African TVET approach resembles that of the United Kingdom and Australia, although the Dutch or German approach would be more preferable owing to strong and balanced links between the supply and demand-driven labour market. The approach puts emphasis on knowledge as a general platform for integrating general education, training and occupational skills. Moreover, the approach stresses the strength of integrating

knowledge, skill and competence. Treating the dimensions' separately will result in incoherent systems, like the ones adopted in United Kingdom and Australia. It is argued in this study that the South African TVET system and that in other countries in Africa which adopted the UK system by virtue of the colonial past, have fallen in the same pathway of skills-based approach and will continue to experience the associated challenges as explained in the literature.

The holistic knowledge approach has not been spared from criticism because of its emphasis on completeness. Hager (1995) highlights challenges associated with achieving completeness in competence as vague, questioning if it is necessary for all to achieve completeness and use of inferences for evaluation of competence. The interpretative-relational approach suggested in Velde (1999) might work since it focuses more on practice. Nonetheless, the current study needs to highlight that the suggested interpretative-relational approach might not work in other countries depending on problems they face. While TVET challenges may appear to be global, a solution which works in one country may not necessarily work in another country.

Although early studies used knowledge, skills and attitude as descriptors of outcomes, this study replaced attitude with competence as in Winterton *et al.* (2005). However, attitude is included as a sub set of competence in the current study. Reasonably sound, the “interpretative-relational” alternative suggested by Velde (1999) in favour of a competence-based approach is seemingly weak on the basis that it tends to ignore cognitive and functional competence instead advocating for sense making approaches through practice and contact with the environment.

It seems more plausible for the South African TVET sector to adopt the knowledge system approach for learning efficiency, particularly in the NCV programmes on the grounds of its relation between theory and practice. Until a better understanding of instructional time impact on knowledge, skill and competence is mastered, the current study predicts that the problem of learning efficiency will remain a persistent challenge in most developing countries, including South Africa.

The literature provided in the current section outlined three dimensions of learning efficiency. Knowledge and skills have been undoubtedly mentioned in prior studies on learning outcomes. The third dimension of competence incorporated in this study is still a grey area, with inconclusive agreements on the phenomenon. It is argued here that evaluating learning efficiency through knowledge, skill and competence attempts to give a comprehensive

understanding to the construct. Therefore, in the current study, social competence and meta-competence are subsumed under a broader competence domain.

Although studies on learning efficiency similar to one carried out by Webster (1992) enlighten us, the analysis differs with the current study on the context and the type of learners. Webster focused on learners with Attention Deficit Hyperactivity Disorder (ADHD) challenges. Insightful as Webster's research on learning efficiency might be, the results cannot be inferred in the present study due to differences in context and situation. Webster (1992)'s study was carried out in the United States of America, a country which is regarded as more developed economically and perhaps with different social and political structures compared to those of South Africa.

Further, understanding of knowledge, skill and competence in evaluating learning process assists in evaluating human capital development. Given the investments on education, particularly vocational education, by countries or world bodies like the World Bank and UNESCO, the human capital theory provides a working base on how economic and social growth can be achieved. Section 2.4 discusses the relation between Vocational Education and Training (VET) and human capital with focus on knowledge, skill and competence.

## **2.4 Human Capital Theory**

Gary Becker popularised the term 'human capital' with reference to personal attributes like knowledge and competences that can be applied in employment and result in economic returns (Becker, 1962). Since then, the concept of Human Capital Theory (HCT) has been used to equate the investments channelled into learning to the associated financial developments and improved opportunities in life.

Studies on HCT (Becker, 1994; Almendarez, 2013) suggest the idea that people with more education stand a better chance in a knowledge economy as compared to those with lower education. For that reason, TVET is suggested as a pathway to improved life status economically (Papier & McBride, 2018). To justify HCT in education and training, Tikly (2013) uses data from two countries: Singapore and Ghana. Economic progress of Singapore has been linked to positioning TVET policies in congruent to economic policies: In Ghana, free education for all made available better-quality access to education, but later backfired because of insufficient funding.

It is probable that economists or researchers with an economic perspective in mind justifiably equate education investments through human capital in contrast to human rights advocates (Robeyns, 2006). Consequently, this perception has a danger of undermining the concept of equal access to education. Regardless of the criticism, however, HCT provides insight into education and training investments as funding is one of the direct inputs in the process. The current section has highlighted the part that Human Capital Theory plays in education. The next section provides a deeper understanding on TVET sector and associated challenges.

## **2.5 TVET sector and associated challenges**

Vocational Education and Training as a sector will never be stable owing to its constant attempt to match labour demands (Heikkinen, 1997). Unless the curriculum is revisited each year, labour demands will always be ahead. However, curriculum change is a policy issue which can take longer periods before implementation as countries have to look at other pressing social issues. In an attempt to see the TVET template adopted in South Africa, section 2.5.1 looks at the international trends and possibly identify how the adopted system may impact on learning efficiency.

### **2.5.1 International trends in TVET sector**

Vocational education is believed to have originated in the late 1800s (Gewe, 2009) after the introduction of apprenticeship frameworks. Post-primary learners would elect a vocation and work under the guidance of an experienced mentor. The process was more informal, with little focus on certification as compared to the strictly academic curriculum within secondary schools characterised by standardised assessments (Benavot, 1983). The need for vocational education may have been driven by three many factors: industrialisation, integration and migration and class separation (Benavot, 1983) as employers needed skilled personnel. Origins of the TVET sector in South Africa is suspected to be linked to the demand for skilled workers in the diamond and gold mines in the early 1800s.

Given the formalised nature of academic schooling, it seems reasonable to also assume that vocational education might have been introduced to avoid disrupting the fluidity of the formal education system. The idea of apprenticeship frameworks in vocational education works well if there is great employer involvement (Kraak, 2016; Papier *et al.*, 2016). Even up to now, it is still believed that countries with TVET systems that are demand-driven are more competitive

than those where the system is supply driven. Most of the countries in developing countries fall into the latter category as they grapple with high youth unemployment and poverty.

Labour-market mismatch has been reported as one of the biggest mistakes that can result in vocational education being rendered ineffective towards its quest to fulfil skills shortage. Kraak (2016) compared two vocational systems adopted by The Netherlands and the United Kingdom. The Netherlands adopted a ‘social solidarity model’ which was demand-driven. Labour markets had a great participation in designing vocational curriculums leading to easy articulation. Learners had the option to revert back to purely academic pathway at any stage. The same system appears to have been adopted in countries like Finland (Heikkinen, 1997), Singapore and Germany (Sakellariou, 2006) where vocational curriculum is dictated by demand-driven markets.

In contrast to the Dutch VET system, UK TVET adopted a ‘statist model’ (Paterson, 2016; Kraak, 2016) which is a supply-driven system. Because the UK VET system was reactive in nature and controlled by the civil sector without positioning itself within the needs of labour market, the system did not work so well. Kraak (2016) argues that chances are that the targets set up might be beyond reach and institutions might end up using unorthodox means to achieve the set targets thereby missing the intended goals of supplying required skills. Interestingly, in the two different systems, vocational education was considered as a pathway for the academically challenged learners. However, in The Netherlands, industry gave vocational education equal status to that of academic mainstream. So which system did South African vocational education adopt? Why should we care to know the systems of these developed countries? It is believed that learning systems adopted by developing countries follow patterns similar to those spearheaded by countries which colonised them (Oketch (2007; Watson, 1994). Section 2.5.2 attempts to identify position adopted by South Africa’s TVET system.

### **2.5.2 The South African context of TVET sector**

Scholars (McGrath & Akoojee, 2009; Akoojee, 2009; Palmer, 2014) do agree that vocational education programmes could possibly be the answer to skills shortage, poverty alleviation and youth unemployment resulting from globalisation. Borat *et al.* (2016:i62) projected that unemployment levels in South Africa stood at 25.4% in 2014 “... youth unemployment is even higher at 42.2% (for youth aged 15–29 years), compared with 18.3% (for adults aged 30–65).” Given the ages of learners targeted by TVET programmes, it is reasonable to believe that South

African government had targeted these age groups by introducing NCV programmes. Although the youth unemployment figures include even university graduates, the focus is on TVET sector learners. Moreover, university graduates stand a better chance of getting employed as compared to TVET learners mainly because of the negative perception of employers (Paterson, 2016; Gewer, 2016). Issues of poor social networks (Gewer, 2009); low minimum wages; labour laws (Bhorat *et al.*, 2016) protecting the aged labour workforce are among the probable causes of youth unemployment. Section 2.5.3 outlines the South African TVET structure in an attempt to understand the empirical setting and drawing connections to learning efficiency which might be a result of the structure.

### **2.5.3 Structure of TVET in South Africa**

TVET colleges offer three types of programmes (DHET, 2015): i) NCV; ii) NATED and iii) Occupational qualifications. The present study concentrates on NCV programmes only because they are targeted by the South African government in developing the much needed skills and reducing unemployment amongst youths. Researchers highlight the emphasis on TVET as mandated by South African governments (Akoojee, 2009; McGrath & Akoojee, 2009; Paterson 2016; Gewer, 2016). Despite efforts by the South African government, statistics (DHET, 2015) has shown that the sector is still struggling with a number of issues, one of which is performance. A number of learners enrolling for NCV programmes are regarded as weak (Papier, 2009; Powell & McGrath, 2013). Additionally, some of the learners are regarded as weak, having dropped out of school because of indiscipline and spending a year or more sitting at home. The above-mentioned cohorts of learners are the ones industry is sceptical to recruit (Papier *et al.*, 2016). Although, of late NCV programmes have also started attracting learners with matric, the majority of the learners are Grade 9, Grade 10 and Grade 11. However, the learners are put in the same class with Grade 9s, 10s, 11s, or 12s, creating a mixed group of different cognitive abilities.

**National Certificate Vocational (NCV)** accept learners for a three-year programme comprising Level 2, 3 and 4. These levels are ranked the same with Grade 10, 11 and 12 respectively on the NQF scale. Each year is an exit level. Learners do a total of seven subjects at each level: four core subjects for each course, an elective, with pure Maths or Mathematical Literacy, Life Orientation and English as fundamental subjects. In 2007, learners who enrolled for NCV courses were expected to pass all the seven subjects at each level for the purposes of progression to the next level. However, majority of learners struggled to complete successfully,

prompting the Department of Education (prior to migration to Department of Higher Education) to allow them to progress despite not meeting the requirement (Papier, 2009; Gewer, 2016). Consequently, this created a bottleneck as learners ended up doing more than the stipulated seven subjects, with some carrying over Level 2 subjects up to Level 4.

After migration from the Department of Basic Education to the Department of Higher Education in 2014, a new rule stipulates that learners cannot advance to the following level in the event that they fail to pass five subjects or more at each level. In addition, they are not allowed to register for more than seven subjects each year, leaving learners with subjects in two different levels. Because these learners end up doing two different levels, subjects failed in the previous year are registered on a part-time basis after failing. The result is that learners register for examination only without tuition and most of them end up failing the same subjects. Finding sufficient support and instructional time for these cohorts is difficult since some of the subjects' times clash with the ones they register for on a full-time basis. Observations by the researcher revealed that learners affected by the new regulation feel demotivated as they are impacted twice with funding from NSFAS withdrawn and being a year behind their former classmates unless if they pass the outstanding subjects during the supplementary examination. What makes the situation more complex is the fact that learners only qualify for supplementary examination if they only fail with an acceptable mark of 45% and above. Although exact figures have not been published when the current report was compiled, the researcher predicts that the number of learners in this predicament is quite substantial. Section 2.5.4 provides a discussion on transition within TVET sector in South Africa.

#### **2.5.4 Transition within Vocational Education sector in South Africa**

Vocational education in South Africa has seen massive changes. The Apprenticeship Act of 1922, which worked in favour of a particular race, resulted in racial disparities in the demographics of vocational education with other races excluded from vocational education. However, the economic boom of 1948 which followed after Second World War saw the need for a more skilled workforce and resulted in the creation of the Central Organisation for Trade Testing (Gewer, 2009). The 1950s saw training of Africans to be self-sustainable in the Bantustans<sup>1</sup> and signing of the Bantu Education Act of 1953 (Lipton, 1972). Technikons (now Universities of Technology), (Blom, 2016) were formed in 1957 after signing of the Technical

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<sup>1</sup> Bantustans were homelands areas for blacks set up through a policy of separation created by the apartheid government. The policy rested on presumption of separation of races for easy governance. This meant that the "surplus black labour" force were forced into these homelands and called when needed (Lipton, 1972)

Education Act of 1967 (Gewe, 2009). Coupled with other socio-political ills of apartheid in South Africa prior to independence (Kraak, 2016), the TVET sector has experienced many changes in an attempt to redress the imbalances. South Africa had about 19 educational departments with 10 examination bodies meant to discriminate among races (Akoojee, 2009). Additionally, the changes in South Africa saw a change in demographics within TVET sector which resulted into 50 public colleges after the amalgamation process of FET colleges.

However, implementation of vocational education needed massive funding to buy machinery, build workshops, train new staff and pay available ones. Akoojee (2009) highlights the structural issues associated with vocational education: funding issues and related FET nomenclature. The FET sector was positioned within the Department of Basic Education until April 2013 and the mandate executed by provincial departments. The mis-positioning of FET colleges created major challenges of inconsistency and incoherent system.

In response to the FET issues in South Africa, Papier *et al.* (2016) observed three major shifts:

- i) Mergers and restructuring of FET colleges (2000-2002): The period saw retraining of black middle managers in the United Kingdom under the name Tirisano Fellowship in an effort to change management composition which saw staff composition changing to 41% blacks and 59% whites in 2002 from 26% and 74% respectively in 1998.
- ii) Recapitalisation (2003-2009): the period saw a cash injection of 1.9 billion rands from the treasury in an effort for colleges to reach autonomy. In addition, new programmes of NCV were introduced (Kraak, 2016) with a motive of increasing learner enrolment within the TVET sector which had shown evidence of decline.
- iii) Moving towards a consolidated post-school system (2010- ): This period is characterised by reintroduction of the near-phased-out NATED programmes and migration of TVET sector from the Department of Basic Education to the Department of Higher Education and Training to improve quality assurance (Kraak, 2016). Despite the above initiatives, Paterson (2016) observed low throughput per graduate subsidy and governance issues with nine colleges in 2013 put under administration.

Although enrolment figures improved to 737 880 by 2015 (DHET, 2017) from 639 618 in 2013 (DHET, 2015), 70% (519 464) of learners were in the NATED programmes with only 165 459

learners in NCV sector, yet NCV programmes have been the major drive by the South African government. The government increased funding channelled through NSFAS to attract learners into the NCV programmes with a cash injection of 2.1 billion in 2014 (Gewe, 2016), 9.3 billion in 2015. In addition, the introduction of the Funza Lushaka bursary for staff training (DHET, 2017) was aimed to assist lecturer staffing for the new programmes. Despite implementation of a number of initiatives, funding issues saw disgruntlement among learners resulting in widespread mass actions of 2015 to 2016. Subsequently, learning efficiency was affected (DHET, 2017) (see Table 2.1). Given the TVET enrolment composition as of 2015 in South Africa, it appears sensible to suspect that perhaps there is positive perception of NATED over NCV programmes, presumably because of easier articulation and positive industry perception. Until the issue of learner efficiency is addressed, enrolment and successful completion figures may continue to favour the NATED programmes despite the initial target of NCV cohorts.

Bearing in mind the associated costs of implementing vocational education (Lauglo, 2010); it is worthwhile investigating whether the sector achieves learning efficiency in its quest to address skills gap, poverty alleviation and reduce youth unemployment level within societies. The human capital theory outlined in section 2.4 highlighted that the resources channelled towards education and training tends to be inclined towards the outcomes (Winch, 2013). Perhaps, as suggested by Winch (2013), policy makers, industry and society at large need to appreciate and show demand for TVET learners in order to maximise the outcomes especially the ones graduating from NCV programmes in the case of South Africa.

Technical vocational discourse has not spared the sector from criticism. Despite reduced time to artisanal status in South Africa (McGrath & Akoojee, 2009), attitudinal perceptions of the society towards TVET sector created a misconception that the pathway is for weak learners (Oketch, 2007; Gewe, 2009; Papier, 2009, Winch, 2013). Consequently, the resulting output of learner inefficiency continues to be experienced in its three facets of skill, knowledge and competence.

Assuming existence of a connection between time and learning, extending instructional time, using MSN platforms is therefore, key motivation of the study to address learning inefficiency among TVET learners in the NCV programmes. Berliner (1990:20) notes that “evidence and common sense inform us that the sign of the relationship between instructional time measures

and measures of achievement is positive”. In that regard, the key application of extending instructional time is well supported in the study.

## **2.6 Key factors contributing to differences in learning efficiency**

The TVET sector has been thrust forward as one of the solutions in resolving skills shortage by providing intermediate (Gewe, 2009) to high level skills which might have been brought about by the expansion of economies. However, the TVET sector has not been immune to challenges of the new economies as well. Despite its success in different countries like Netherlands (Heikkinen, 1997), Singapore and Germany (Sakellariou, 2006) and others, criticism of TVET sector has been more pronounced in developing countries and South Africa has not been spared. TVET sector weaknesses and strengths are easily recognisable by the industries directly responsible for recruiting the graduates for employment purposes (Gewe, 2016; Wedekind & Buthelezi, 2016). Regardless of efforts by the South African government in making the TVET sector viable, a number of challenges have been reported and appear to scuttle the key focuses of TVET as they have direct or indirect influence on learning efficiency.

Literature highlights a plethora of factors used to investigate learning efficiency and these includes: (a) low pass rate; (b) education–labour mismatch; (c) TVET social image; (d) articulation issues; (e) lecturer incapacity; (f) mismatch of learners and programmes; (j) learner support;(h) quality assurance; (i) quality of instruction ;(j) insufficient time; k) governance.

### **a) Low Pass rates**

Even though governments keep pushing vocational education as a solution to skills shortage or unemployment, the sector in South Africa is synonymous with low pass rates (Gewe, 2016; Blom, 2016). According to the DHET report on Statistics on Post-School Education and Training in South Africa: 2015 (DHET, 2017) there was a decline in completion rate of 8.3% from 42.8% in 2011 to 34.5% in 2014 for NCV level 4. As shown in Table 2.1, successful completion rates only started picking up in 2015 (40%), but it was still lower than the completion rate for year 2011. Notably, these statistics also included private colleges. Moving on to NCV Level 4 specifically, the same report (DHET, 2017) indicated Information Technology as the worst performing discipline for the year 2015 with only 223 (17.76%) out of 1255 learners successfully completing the course. While there was a steady growth in enrolment, the completion rate was falling until 2014, as shown in Table 2.1.

**Table 2. 1: Summary of National NCV results for year 2011-2015**

Year	NC(V) Level 4		
	Number wrote	Number completed	Completion rate (%)
2011	17 836	7 638	<b>42.8</b>
2012	15 334	6 018	39.3
2013	22 470	8 346	37.1
2014	22 705	7 838	<b>34.5</b>
2015	26 144	10 465	<b>40.0</b>

(Sources: Extracted from DHET 2017:2)

Given the statistics in Table 2.1, it is to no surprise why horizontal and vertical articulation for NCV graduates has been reported as a major challenge (Blom, 2016) with the sector viewed as underperforming (Paterson, 2016). Researchers highlight the disparity between low throughput figures experienced within NCV in comparison to amount of subsidy spent per graduate (Paterson, 2016) and the unproportioned increase in enrolment figures in comparison to decreasing pass rates as too high (Gewe, 2016). This study attempts to point out that learning efficiency appears to be going down further. With statistics as those shown in Table 2.1, filling in the perceived skills gap or mismatch becomes very challenging unless if collective interventions are put in place.

#### **b) Education-Labour mismatch**

The relation between education and markets must be closely monitored less they do not benefit from each other. According to Perry, Wiederhold and Ackermann-Piek (2014:138) “skill mismatch occurs when skills possessed by the workers exceed or do not meet the skills required at their workplace”. Research reports cite skill mismatch in South Africa (Papier, 2009; McGrath & Akoojee, 2009; McGrath, 2012; Papier *et al.*, 2016), Ghana (Anane, 2013) and surprisingly in industrialised nations, for example, the United States of America also (Cappelli, 2015). Although mismatch in its simplest form might not be a problem, assuming that the same graduates are employed in a field which they did not train for, it may potentially result in skill depreciation. Ultimately, the negative effect will be an increase in skills gap within the labour markets. Since skill is a key driver of economies (Perry *et al.*, 2014)) its absence can be dire to the industry, education sector and society at large. This study argues that mismatch mat potentially be reduced if learner inefficiency is addressed at its source.

While TVET colleges might attempt to deal with learning efficiency issues to address skills shortages or mismatch, the issue also demands attention at a global level. One of the arguments posed along the context of mismatch in this report is that world bodies like UNESCO and International Labour Organisation (ILO) must work together because different aims lead to

uncorroborated objectives in member states. While it is not the focal point of the current investigation, merging of the two bodies or some kind of linkages may potentially have a positive impact.

**c) TVET social image**

One of the challenges of NCV programmes has presumably been due to negative perception by employers who appear reluctant to recruit the graduates whom they perceive to be inexperienced (Bhorat *et al.*, 2016). Despite an increase in employment statistics of approximately 6.3% in the post-apartheid era in South Africa (1995-2015) with 5.6% of the population being blacks, a significant number (11.3%) of qualified graduates from the TVET sector are not employed (Bhorat *et al.*, 2016). Possibly, unemployment levels of these cohorts is intensified in South Africa by the negative perception from industry stakeholders. Be that as it may, there are likewise different ways of thinking which propose poor non-cognitive skills of the learners, negative employer perception, low levels of economic growth (Bhorat *et al.*, 2016) and disregard of the informal sector (Oketch, 2007).

In addition, labour unions are also suspected to contribute in unemployment figures because they are reluctant to force industries in employing NCV graduates in South Africa. Latchem (2017b) highlights the fear by labour unions to employ these cohorts on the premise that vocational graduates will affect employment status of the majority of old-aged low skilled workers. Although labour unions are important in improving attractiveness of TVET (Winch, 2013) and fighting for better working conditions and minimum wages, employers seem to be reluctant to recruit TVET graduates whom they perceive as inexperienced (Bhorat *et al.*, 2016). It remains unclear if the labour union leaders are not manipulated by industry leaders to not advocate for increased recruitment of TVET graduates; however, this is not the focal point of the present examination and will not be discussed in detail. Subsequently, the lack of demand from employer side particularly contributes towards high unemployment rate for TVET graduates.

**d) Articulation Issues**

Even though vocational education system is meant to provide alternative learning pathways, articulation is still a persistent issue within the TVET sector, particularly in South Africa. This is probably because TVET is positioned partly within schools, higher education and occupational sectors. Since there “are currently no clear articulation routes for further study for

students completing these programmes” (Blom, 2016:56), the current study suggests that possibly NCV learners are not motivated to perform as there is no target or clear articulation paths (Papier, 2009; Powell, 2012; Blom, 2016).

Powell (2012) highlighted that there are learners who enrol at TVET institutions under the misconception that certain courses give them an edge to enrol for certain programmes at university. In some instances, these learners become doomed when they discover that some of the programmes of their choice still require good passes at matric level. Despite efforts to encourage university of technologies to enrol TVET graduates in South Africa, the entry requirements are so high, with 60% and 70% minimum scores for fundamental and core subjects respectively (DHET, 2009). Given most of the learners are regarded as already weak (Oketch, 2007; Papier, 2009; Blom, 2016), meeting such a pass mark can be an uphill task. Failure to articulate horizontally or vertically impacts negatively to the skills base of the country.

**e) Lecturer incapacity**

One of the biggest challenges synonymous with learning efficiency within the TVET sector has been attributed to lecturer incapacity. The idea of lecturer incapacity has been cited by the South African government in its TVET reports (DHET, 2009, DHET, 2015, DHET, 2017). Although there could be an assumption that an inexperienced facilitator has a potential to develop to mastery after two or more years engaging with the content, Heikkinen (1997) found out that vocational educators must be heterogeneous in nature: with a balance in orientation towards industry and towards education. Deficiency in one area may potentially affect how the lecturer gets on well with the curriculum. Gewer (2016:32) cited a report by NBI which found “... two thirds of these lecturers had no teaching qualifications; a third had no technical qualifications...”. Wedekind and Watson (2016) found out that out of the 1650 lecturers interviewed in the provinces of Gauteng and KwaZulu-Natal, only 703 lecturers possessed at least teaching qualifications though of varying nature. From the 703 who had at least teaching qualification in that research, only 43% had industry qualification and experience (Wedekind & Watson, 2016).

Admittedly, it might be a challenge to find a lecturer with strong practical orientation and academic attributes, this study suggest that such lecturers might be the best for TVET learners. It is possible that learners taught by a vocational lecturer who is more inclined towards industry

might probably have an edge in practical aspect as his/her focus tends to be bend towards the lecturer preparing learners for industry absorption. Likewise, learners taught by a lecturer who is more academically inclined are more likely to find theory aspect of the subject easier and perhaps advance with studies as vertical articulation is always key focus if progression pathways are clearly defined. In any of the instances, learner efficiency is impacted either on the theory aspect or practical aspect.

**f) Mismatch of learners and programmes**

Incorrect match of target learners and programmes result in learner efficiency issues because of cognitive differences. Performance can be attributed to cognitive characteristics (Pask & Scott, 1972; Ford & Chen, 2001). The Grade 9 learners are thought to be cognitively immature for the challenging NCV curriculum (Papier, 2009). The fact that a pass in Grade 9 is set as minimum entry qualification has meant that there is a mix of learners of varying cognitive skills. Although it might be an advantage to those learners with perceived higher cognitive levels (Grade 10, 11 and 12s), the grade 9s are seen to be at a disadvantage as lecturers do not possess the appropriate pedagogical skills for learners of different abilities. The consequence has been dreadful with high dropouts or unsuccessful completion (see Table 2.1) as learners think that since the entry requirement is low therefore the curriculum must be easy. Until the issue of mismatch is resolved, the viability of NCV programmes in South Africa remains threatened.

**g) Learner support**

Learner support is believed to play an important role towards learning efficiency from enrolment to exit (Papier & McBride, 2018). Any form of support to the learners ranging from financial, social and moral has a positive effect on performance as learners will be left with fewer issues to deal with leaving them with more time towards learning. Papier's (2009) study found that learners (n=14) ranked learner support as highest contributor towards success. Similarly, lack of support could be detrimental to performance of the learners. One of the initiatives by the South African government has been improved support provided through increased funding for TVET learners (Blom, 2016; DHET, 2017). This is seen as an attempt to lessen substantial burden off from the parents and learners. Apparently, increased funding brought another problem of increased enrolments in relation to infrastructure and policies available. Additionally, the funding model is believed to contribute towards low passes as there is no cost attached to it from the learner side. Consequently, it creates a perception to some learners who view the programmes as finding something just to occupy themselves with in the

meantime (Blom, 2016). Unless, if the beneficiary view the bursary as money which they owe to the government, they may potentially develop an attitude where they do not care since the fees is not coming from their pockets.

In addition, TVET colleges were instructed by the DHET to have learner support services. However, lecturers seem to be reluctant to refer learners to campus student support on the basis that the personnel employed is under-qualified for typical problems presented by the cohorts of learners who are regarded as ill-disciplined, weak, and might have been removed from school due drug abuse and gangsterism (Powell & McGrath, 2013) particularly in Western Cape Province (Papier, 2009). While learner support service is crucial at any learning institution, the personnel need to be equipped for any challenges that arise within the system (Papier & McBride, 2018). Gewer (2016) highlighted that support is often scuttled by too much focus on issues which have direct impact on performance and budget. This potentially poses a danger of ignoring other indirect challenges.

#### **h) Quality Assurance**

Vocational education institutions have been for long criticised for mass production of qualifications without proper quality assurance structures (Latchem, 2017b). Because vocational education is characterised by constant changes, implementation of quality structures is always a challenge. Unlike in developed countries like Germany where the quality assurers of vocational education are housed within the Ministry of Economy and Labour, information in the World TVET<sup>2</sup> database has shown that quality assurance bodies in developing countries fall within Ministry of Higher Education. The Botswana Training Authority<sup>3</sup> in Botswana, UMALUSI, South African Quality Assurance (SAQA), and Council of Higher Education (CHE) in South Africa, Directorate of Standards Development and Quality Assurance (SDEQA) and Higher Education and Examination Council in Zimbabwe (HEXCO) all fall within the departments of Higher education in the respective countries.

The three education bands (GET, TVET and HET) (Wedekind, 2016), which are the brainchild of NQF, brought with it quality assurance issues. Further, relocation of TVET sector to the DHET appear to have created more blurring boundaries among quality assurance bodies (Wedekind, 2016). On the basis that TVET sector falls under the DHET, it would be ideal to

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<sup>2</sup> <http://www.unevoc.unesco.org/go.php?q=World+TVET+Database>

<sup>3</sup> [http://www.unevoc.unesco.org/wtdb/worldtvtdatabase\\_bwa\\_en.pdf](http://www.unevoc.unesco.org/wtdb/worldtvtdatabase_bwa_en.pdf)

have the Council of Higher Education (CHE) as the quality assurers. However, there is quality assurance from the DHET and also from UMALUSI seemingly repeating the same exercise. From a lecturer perspective, it can be regarded as duplication of roles aimed at creating more work on their side. Undeniably, quality assurance is important but duplication of effort potentially results in instructional time wastage as lectures attempts to comply. Possibly, a more laudable option for TVET sector would be to draw quality assurance body from both the labour and education ministry since the ultimate goal is for the learners to move into industry or universities when they finish their studies.

**i) Quality of instruction**

‘Quality of instruction’ plays a key factor in determining academic achievement since it triggers engagement of learners and increases potential of achieving planned outcomes. Quality of instruction is directly linked to evenly spread resources and learner capabilities. Research reports (Karweit, 1985; Gettinger, 1989; Tikly, 2013; Lavy, 2015) emphasised the need for quality instruction in a bid to have increased student achievement. According to Walberg (1988:83), quality of instruction “... can be understood as providing optimal cues, correctives, and reinforcement to ensure the fruitfulness of engaged time”. Quality of instruction has the potential to influence performance outcomes since the educator can manipulate it depending with the intended outcomes or corrective measures needed. Nevertheless, it is not obvious that quality of instruction subsequently translates to improved outcomes since learning is also impacted on by other factors such as learner cognitive ability, environment, feedback and others. However, consistent with other findings, it is not the goal of this research to ignore the significance of quality of instruction in improving academic achievement but to emphasise the power of learner-lecturer contact when using MSN to extend instructional time.

**j) Insufficient time**

Educational initiatives require sufficient time for proper implementation and evaluation. As noted by Duncheon and Tierney (2013), understanding of instructional time is fundamental for the purposes of allocating resources, acquiring skills knowledge and competence, and designing instruction. Regardless of Gettinger’s (1989) studies which found inconsistencies on instructional time and performance, the current research would argue that instructional time is important. Consequences of less instructional time can be dire since educational initiatives might not be successfully completed. Jacobson (1980) proposes that there is a close connection between academic achievement and instructional time. Undeniably, Walberg’s (1988)

argument that there are other factors equally important for academic success apart from instructional time, this study suggests that instructional time deserves equal attention too. A possible solution which appears more sustainable on the part of lecturers to address instruction time issues might be use of Mobile Social networks. Indeed, most of the studies carried out on instructional time in the early 90s and beyond never considered such technologies.

Another important aspect of instructional time is the limited literature particularly in the TVET space. In addition, most of the studies carried out on instructional time were conducted in Europe and American countries (Fredrick & Walberg, 1980; Berliner, 1990; Duncheon & Tierney, 2013; Rivkin & Schiman 2015) making arguments weak to infer with certainty in developing countries. With reference to least developed countries (LDCs), Benavot and Gad (2004:294) remark "... quite a few studies have examined the impact of instructional time on pupil achievement in LDCs". The researcher wishes to suggest that instructional time is given less attention in developing economies that it deserves.

Irrefutably some of the causes of instructional time loss in LDC's are unavoidable notwithstanding limited effort to recover the lost time like extra classes. Abadzi (2007, 2009) argues that learning institutions in economically disadvantaged areas are likely to suffer more instructional time loss due to absenteeism (teacher or learners), early dismissal or school closed. For instance, out of 197 school days in Ghana, schools were closed an average of 3.17 days with teacher absenteeism at 43.01 days while Morocco had 1.38 days of school closure and 13.36 days of teacher absence out of a possible of 204 days (Akoojee, 2009). Instructional time dwindles along the year due to various intentional and unavoidable issues. What is intriguing in Abadzi's (2007, 2009) studies is absence of an attempt to recover time beyond normal learning time despite being published after the advent of MSN platforms. Since the research was funded by the World Bank with focus on developing countries, it can be suggested that the outcome was predetermined and purposeful. What is not debated is the fact that more instructional time is lost in challenged economies like South Africa and other developing countries. It is suspected in the present study that perhaps after realising the issue, NSFAS funding within the TVET sector is now attached to attendance (Papier & McBride, 2018). He finds it difficult to ignore the topic understudy considering the amount of instructional time lost as lecturers attempt to deal with varying delinquencies for learners enrolled in the NCV programmes (Papier, 2009; Powell & McGrath, 2013). In section 2.7, instructional time phenomena is discussed at length.

### **k) Governance**

Control of TVET colleges has always been an issue in South Africa owing to “differentially governed educational landscape” (Wedekind, 2010:304), structural positioning and the related nomenclature. In South Africa, TVET colleges are run by college councils which comprise of lecturers, learners and council representatives. The FET Act of 1988 in South Africa “provided for the establishment, governance and funding of public TVET Colleges and the registration of private TVET Colleges” (Wedekind, 2016:7). Among the key mandates of FET Act of 1988 was the effort to address the demographic imbalances, improved autonomy and improving education and training access. The FET Act of 2006 was presented in an attempt to resolve the related nomenclature and saw the distinction between schools and colleges (Wedekind, 2010). Prior to the relocation of TVET colleges to the DHET, funding-related issues remained under the national government while finance and administration were the mandate of provincial governments. Funding was channelled from the National Treasury to provincial governments in South Africa for disbursement to different colleges. However, not all provincial governments were under the ruling party of African National Congress (ANC), therefore goals and targets differ politically and as such affected flow and use of the funds. Later in 2015, TVET colleges were relocated to the DHET which also created other governance issues. At the time of migration some colleges were left with no college councils as the term of office for previous councils had expired (Gewe, 2016). Another controversial aspect brought by the migration were employment conditions of lecturing staff with some enjoying 37% benefits as cash payments whilst some colleges preferred to withhold the benefits and force recipients to apply for these benefits. Perhaps, this might have caused disgruntlement among lecturers who felt they were now deprived of a benefit which they used to enjoy as colleges disburse the benefit differently. So the disgruntled lecturers may possibly have an effect in learning efficiency.

In regard to TVET issues raised in this section, some commendable efforts were made to address the challenges. However, in all attempts there is no mention of addressing instructional time albeit evidence that there is time lost due to several factors like student protest action potentially affecting learning efficiency. This study attempts to propose sustainable practical interventions for extending instructional time. The subsequent section provides the different contact styles which lecturers and learners may consider when using MSN applications.

## 2.7 Assessing the different instructional contact styles in MSN environments

In this section, the researcher discusses the concept of contact styles borrowed from psychology's Gestalt therapy. The researcher applies the contact styles in relation to MSN learning environments. Optimisation of MSN collaboration is reliant on the contact styles of participating members. Polster and Polster (1973) suggest that disturbances of boundary between people impacts on contact styles. As learners collaborate with each other, they also get in contact with the environment which potentially impacts on their skills, knowledge and attitudes (Bentley, 2002). Fundamental to the contact process as defined in gestalt therapy would be connecting, being aware of each other or moving away from each other. Following Brownell's (2010) suggestion on contact, it is proposed in this investigation that the present generation of learners who are technologically inclined, learn from each other as they collaborate through contact on digital platforms. Researchers (Polster & Polster, 1973; Bentley, 2002) identify different contact styles and these are explained in relation to the current context in Table 2.2.

**Table 2. 2: Contact styles**

Contact style	Meaning
Introjection	Occurs when a participant accepts contribution irrespective of its worthy to avoid contradiction.
Projection	Occurs when a participant considers the feedback he/she wants to say as if it's being said to him/her.
Retroflection	Occurs when recipients just take in whatever and do not comment. This is typical for hitchhikers or social loafers.
Confluence	Typical for people who take part in collective action. Only danger is people tend to lose the self
Deflection	This contact style is typical of people who want to stay focused
Desensitising	Occurs when participants are open and aware (Bentley, 202:204)

(Source: Adopted from Bentley, 2002)

In the context of the current study, deflection or desensitising contact style would be the most plausible since MSN environment are social and participants can easily lose focus. However, preferred contact styles may differ with individuals and as such, a negotiated one would be preferable in order to get the best from MSN environments. Part of the objective set out in section 1.3 is to assess the different contact styles between learner and lecturer and see how it contributes to success of MSN environments meant for extending learning time. The subsequent provides a critical analysis of instructional time concept in learning.

## 2.8 Instructional Time

Instructional time is important because it is a resource ploughed into the learning process. Like any other educational input, instructional time as a resource needs to be used wisely to realise

the benefits (Karweit, 1985). Bloom (1974:682) postulated that “all learning whether done in school or elsewhere requires time.” However, because of the related complexity to measure or predict instructional time, other researchers (Anderson, 1976; Fredrick & Walberg, 1980) criticise the idea. Indeed, there is incoherent data regarding its impact on learning efficiency in spite of the debates which date back as far as the 1960s after Carroll’s ‘model of learning’ (Carroll, 1963) and mastery learning models (Bloom, 1968). Berliner (1990) argues that criticism on instructional time may be on the magnitude and significance. However, like any other subject, instructional time usefulness fits as a scientific concept as it allows policy makers, educators to “understand, predict and control instruction” and outcomes (Berliner, 1990:10). The three factors are mutually symbiotic. The ‘model of school learning’ (Carroll, 1963) and mastery learning model (Bloom, 1968) provide a solid understanding, prediction and controlling of learning efficiency through manipulating instructional time. To give a perspective of instructional time, the researcher discusses Carroll’s ‘model of school learning’ (section 2.8.1), mastery learning (section 2.8.2), and types of instructional time applied in other studies (section 2.8.3).

### **2.8.1 Revisiting Carroll’s model of school learning**

The ‘model of school learning’ expressed learning as a component of time expected to learn against the real time spent (Fredrick & Walberg, 1980). Carroll proposed that time spent is a function of perseverance and opportunity with each being a result of allocated time and engagement rate as measures respectively. Learning outcome depends on many factors such as perseverance (Fredrick & Walberg, 1980), opportunity to learn, understanding ability, quality of instruction, aptitude, “affective entry behaviours” (Bloom, 1974:687).

Carroll suggested that a learner could reach mastery if he/she puts more effort in a concept and is determined to learn. Fundamental to the ‘model of school learning’ is instructional time. Karweit (1976) argues that the model considers learning as a linear process, yet a longer school year could be impacted by teacher or learner absence. Despite the criticism, the theory became foundation of most studies on instructional time and achievement. Mastery learning concept was further expanded based on Carroll’s model (Bloom, 1974).

### **2.8.2 Mastery Learning**

Bloom observed that time needed to reach a concept was less for learners in less challenged economies as compared to challenged economies predicting wastage of instructional time in the earlier states. In mastery learning, achievement is kept constant with time as the variable

(Fredrick & Walberg, 1980). Learners in favourable areas or states attain mastery criterion faster. Bloom (1974) observed that the slowest 5% of learners in less favourable states require five times as much as those in the top five of the favourable economies. As time is increased the ratio changed from 5:1 to 3:1. From the observation, Bloom hypothesised that any learner can attain mastery given enough time, help and support. Bloom (1974) believed that there is more instructional time loss in challenged societies, a concept later supported by Abadzi (2007; 2009). Abadzi (2007:3) found out that “the percentage of time that students were engaged in learning vis-a-vis government expectations ranged from 77.9% in Tunisia to 38.7% in Ghana”.

Crucial to mastery learning is the “cognitive entry behaviour” which Bloom (1974:685) explains as prerequisites knowledge for any future learning. Affective entry behaviour includes the motivation to learn. According to Bloom, it follows that when a learner reaches mastery criterion, it then serves as motivation for future learning. Mastery learning theory is insightful in the current study as two crucial domains in learning are included: cognitive and affective which forms knowledge and social competence in the current study. However, it is not clear to us as to what constitutes mastery. Nonetheless, mastery learning extends from Carrol’s ‘model of school learning’ with new dimension not completely divorced from instructional time and achievement.

Research reports highlighted the complexity of instructional time studies. For instance, Caldwell *et al.*, 1982:476 suggests that “ways to measure” are not homogeneous and angles through which the concept is viewed may differ as well. Fredrick and Walberg (1980:183) used four broad dimensions to measure instructional time and these are: “years of schooling, days of instruction, hours of classes, and minutes of study”. While the dimensions given apply when instructional time is treated as a linear construct, they do not sufficiently apply when time is treated as a virtual construct. Although it is known that mobile devices was not so rife in the early 1980s, but existence of informal learning beyond learning institutions has been suggested many years ago in social learning theories (Vygotsky, 1962). This study suggests treating instructional time as a virtual construct which can be availed through MSN. The two challenges that appear to exist in all instructional time is on how the construct is measured (Berliner, 1990) and the different ways to view its influence (Caldwell., *et al.*, 1982). With regards to the present investigation, we use acknowledgements from learners and test scores to check if there was a connection. This study still values other factors like quality of instruction and affective entry

behaviours when it comes to performance. On that note, we support Rivkin and Schiman's (2015) study that reported improvement in performance after extending instructional time but also acknowledging other factors. Section 2.8.3 identifies the different types of instructional time and the related research.

### **2.8.3 Types of instructional time**

#### **a) Time-On-Task**

The overall period devoted by learners to academic tasks effectively is known as time-on-task (Karweit, 1985; Caldwell *et al.*, 1982; Berliner, 1990). Bloom (1974) suggested that factors such as classroom environment and prerequisite knowledge affects time-on-task. Firstly, if a student performs well in the preceding tasks, he/she enters the next task with enthusiasm and motivated. Associated affective entry behaviours and prerequisite knowledge will improve the time on task. Caldwell *et al.*, (1982) observed that learners spend the first 15-20 minutes of the lesson settling down and the last 15-20 minutes thinking of the next lesson. However, there is no guarantee that during the 15-20 minutes of supposedly productive time, the student will be paying attention as some learners use the time as an opportunity to socialise or discuss how boring or entertaining the lesson is. During the lesson, both the lecturer and the learners are always constantly checking time. While the lecturer would be wishing for extension of time to complete the planned tasks and or syllabus in time, the learner, especially the ones struggling on the contrary will be calculating amount of remaining time for the lesson. Further, prolonging the lesson makes some struggling learners feel like they are being punished (Cuban, 2008). Data analysed by Caldwell *et al.* (1982) showed increase in achievement related to time on-task with another set of data showing negative impact at a certain point.

Secondly, time-on-task increases with grade but as time progresses, cognitive entry and affective entry behaviours are overtaken by quality of instruction in predicting achievement (Bloom, 1974). Although measuring what happens in a student's mind is controversial since its objective. This goes to show that time-on-task is dependent on other variables hence making it very difficult to conclude its impact on achievement. Bloom (1974) observed a 50% to 90% variation on time-on-task that could be perhaps a consequence of negative financial, social and political circumstances. The sample for the current study cannot be excluded from these situations making time-on-task not reliable for the current study.

**b) Elapsed time**

Elapsed time “is the amount of time spent from the beginning of a learning unit until the completion of the unit at the criterion level of mastery” (Bloom, 1974:684). Learner ability varies depending on aptitude and affects the time one takes to reach mastery level. The assumption that ability differs in a ratio of 5:1 indicates variation in learner ability therefore the time taken to reach mastery level will never be the same. Bloom (1974) postulated that if each learner is provided with enough help and time he/she needs, 90% will reach criterion. Fixing time to learn makes it so difficult for the slow learners or learners from challenged economies to reach mastery levels. Moreover, with disruptions that occurs during learning time fixing time to learn results in learners struggling to reach mastery. If mastery level is to be kept constant, then instructional time needs to vary (Bloom, 1974). It is argued in this study that MSN platforms may potentially assist in giving each learner the time needed to reach mastery which in some instances would be difficult to do during face-to-face classes.

**c) Allocated Time (ALT)**

ALT is the amount of time availed by policy makers and education departments in the different countries for a specific subject. Allocated time is a very useful variable used when structuring lessons, pacing and monitoring learners and reviewing achievement. Even though allocated time is pre-set, there are non-academic activities (transition time) which occur before and after instruction hence ALT might still be a crude descriptor as utilisation of given time differs per college and from one lecturer to another (Stallings, 1980). Moreover, policy makers or education departments have no control of time-tabling within institutions. Caldwell *et al.* (1982) observed that schools spend more time on numeracy and literacy on the assumption that they are the foundation of all subjects. Similar to NCV, there are fundamental subjects like Mathematical Literacy and English, which perhaps have nothing to do with IT. Results on allocated time studies collected from 118 Grade 3 learners indicated a one-day higher retention for the group where learners had less time compared to the required time to learn a concept (Gettinger, 1989). While the reported results sheds light on allocated time, they study was done using learners at a lower level than the ones studying NCV. Therefore, allocated time is questionable when reporting learning efficiency.

Perhaps another form of learning time called ‘academic learning time’ provides a better position in predicting outcomes. Another form of instructional time is academic learning time. Academic learning time is the measure of time a learner devotes to the subject content. Higher

level of academic learning time may reveal the willingness of learners to learn and assist in predicting the time needed for next assignments (Caldwell *et al.*, 1982). Classrooms characterised by order, discipline, less challenges socially and economically together with quality instruction are more likely to benefit even if time is not increased since they will learn more due to less disruptions.

**d) Other forms of instructional time and related studies**

There have been cases where length of learning time showed positive improvements in performance. For instance, Karweit (1985) noticed that the length of the school term in Taiwan and Japan was longer in comparison to the one followed in America. Learners in Taiwan and Japan were found to be better academically. Increasing school term may potentially be implemented as a solution, however, other learners may opt to absent themselves from school intentionally or unintentionally. Perhaps, other perspectives of viewing instructional time as those suggested by Duncheon and Tierney (2013) require consideration.

Duncheon and Tierney (2013:237) identified three ideologies: “clock time”, “socially constructed time” and “virtual time”. The ideology which one subscribes to determines how one treats instructional time for achievement purposes. The “clock time” paradigm treats instructional time as linear concept leading to a positivist assumption relying more on standardized tests. On the other hand, the way people perceive time construct differs and is not constant leading to a subjectivist view and this is referred to as “socially constructed time”. Technological innovations have changed the way how people perceive time. For instance, social networks, instant messaging applications and other chat applications enable people to share content without time boundaries and this is referred to by Duncheon and Tierney (2013) as ‘virtual time’.

In this study, all three ideologies are regarded as important. TVET courses, particularly NCV programmes have to be completed within three calendar years. Virtual time is achieved through use of MSN which enable learners to participate from different locations anytime while socialising as well. As much as time can be perceived differently, technology in the form of MSN reshapes the way people experiences time (Duncheon & Tierney, 2013). Quality and quantity of instruction can be manipulated by lecturers if they are part of the network.

### e) **Issues related with solving instructional time**

Fixing instructional time is a big challenge within learning institutions because of various reasons. First, it is costly to alter school calendar apart from impact exerted on taxpayers (Cuban, 2008). In South Africa, the length of a college day at TVET institutions differ similar to what was observed in the United States of America by Berliner (1990).

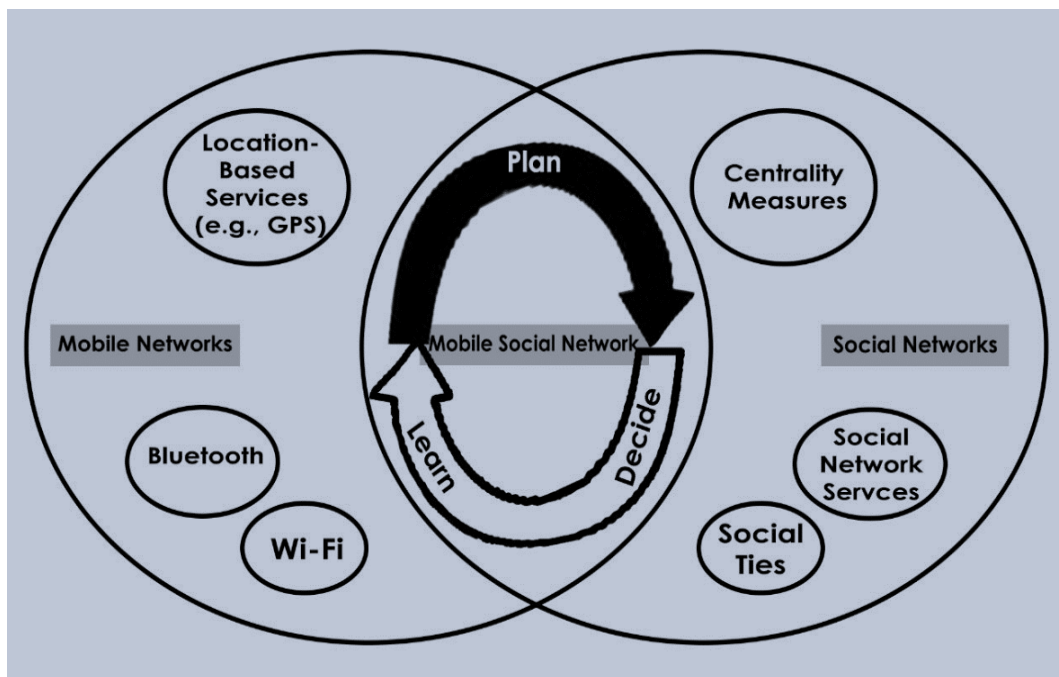
Second, fixing instructional time is controlled by political calendars. In most cases majority of policy makers are from the ruling parties, therefore the policies that they put forward are reviewed in most cases after a period of five years when new people are elected. Third, fixing instructional time requires everyone's participation from parents, community, learners, education funders and policy-makers. In that context, a possible solution which requires less participation of key players could be utilising MSN platforms like WhatsApp. Most of the reviewed studies appear to concentrate on instructional time within the perimeters of learning institution yet the proliferation of technology has meant that learners can also learn from any location (Koole, 2009; Traxler, 2009, So, 2016; Reyhav, Ndicu & Wu, 2016). Despite the challenges of ascertaining whether the learners will be effectively and efficiently learning while using technology, extending instructional time beyond learning institutions with monitoring can potentially assist in improving learning efficiency.

Furthermore, the studies on instructional time concentrated on literacy and numeracy focusing on either primary schools or secondary schools. While the evidence is insightful but the context is different from TVET setup which is the focal point of the present investigation. More so, a number of studies reviewed specifically for the present investigation were carried out in America and other economies different from the challenged economies with the exceptions of Abadzi (2007, 2009); Benavot & Gad, (2004). A study focusing on TVET learners in a South Africa might shed light to similar instances within developing countries. Section 2.9 outlines Mobile Social Networks to give an understanding of the proposed intervention.

## **2.9 Mobile Social Networks**

This section explains the types, uses, characteristics, and design instances of Mobile Social Networks which act as a prologue to the conceptual MSN framework presented in Chapter Three. The spread in use of mobile communication technologies has seen the increase in convergence of “social computing and mobile networking” (Mao *et al.*, 2016:1). Within the social network sphere there are the social network ties made up of people with similar interests

identified through a mechanism known as “community detection” (Kayastha *et al.*, 2011:2128: Song *et al.*, 2015; Mao *et al.*, 2016). Strength of a network largely depends on user understanding of the group principles and entities (Kayastha *et al.*, 2011) in what Mao *et al.*, (2016:1) referred to as “cognitive loop”. In a cognitive loop, networks are able not only to understand themselves and decide on action but also to identify places where users regularly visit. As people interact in an MSN environment, they are able to learn, plan and take decisions (see Figure 2.2).



**Figure 2. 2: Structure of Mobile Social Network**  
(Source: Adapted from Kayastha *et al.*, 2011)

Conversely, the convergence has resulted in the discourse and blurred boundaries between the different technologies. For instance, terms like Social Network Sites (SNS), Mobile Social Networks (MSN), Online Social Networks (OSN), and Mobile Instant Messaging (MIM) have been used interchangeably with other researchers attempting to separate them. Additionally, advanced functionalities have seen an overlap in design, architecture and characteristics encroaching into boundaries of each other thereby adding more confusion on classification (So, 2016).

The current study uses the term ‘Mobile Social Network’ (MSN) to refer to all applications or tools that supports the social network utilising mobile devices. For the purposes of the present discussion, WhatsApp, an instance of MSN with instant messaging capability is adopted.

Although several researches (Rambe & Bere, 2013; So, 2016) use the term Mobile Instant Messaging, the researcher would argue MIM is more of a capability. Moreover, narrowing the term tends to ignore the advances in technology where survival of applications is determined by functionalities. However, classification is not the debate of the current study. Despite different terminology used whether MIM or MSN, the consensus shared among different tools is the collaboration facility which is fundamental in extending instructional time. The results from a study by Rambe and Bere (2013) help to support the argument presented in the current investigation on the use of MSN tools in teaching and learning.

MSN applications allow sharing of information and collaboration amongst users connected in the same network. Apart from some platforms (SNS, OSN) being accessed only through web (Boyd & Ellison, 2010) while others (MSN, MIM) are accessed through mobile interfaces, the tools do share common purpose and usage.

In a Mobile Social Network, users sharing the same interests connect with each other using mobile devices like cell-phones, tablets or personal digital assistants. Examples of MSN instances include WhatsApp, Viber, Telegram, and Facebook Messenger and others. Potential users are required to sign up for the first time or sign in once registered to get access. However, the purposes of these tools remain the same: collaboration, sharing information amongst users or connections. The current study opted for WhatsApp as an MSN instance because they use less data compared to SNS platforms like Facebook. A discussion on popular instances of MSN is provided in section 2.9.3.

### **2.9.1 Types of Mobile Social Network**

Typically, within an MSN platform there is sharing of content with immediacy of feedback (Spencer & Hiltz, 2003). The Instant Messaging (IM) functionality gives MSN tools an edge over other traditional social network tools. Researchers (Kayastha et al, 2011; Song *et al.*, 2015) identify two types of MSN as web-based MSN and decentralised MSN. The first is when MSN is accessed through a web browser and the latter results in users connecting to each other but without an access point by using functionalities like WI-FI, tethering or Bluetooth. With regards to the present examination, it is expected that learners who have connectivity issues may make use of such functionalities to communicate with other learners. Table 2.3 summarises the different architectures of MSN and the corresponding operating modes.

**Table 2. 3: MSN Architecture**

<b>Architecture (Kayastha et al.,2011)</b>	<b>Operating modes (Mao et al., 2016)</b>	<b>Infrastructure</b>
Centralised architecture	Internet-based mode	Resembles client server architecture with content provider as the server and mobile users as the client. Typical of web based MSN.
Distributed architecture	Self-organised mode	Content transmission is through ad hoc networks. Users share content directly through Wi-Fi, Bluetooth tethering and others without need for central server
Hybrid architecture	Hybrid mode	Allow users freedom of selecting either centralised or decentralised mode

(Source: Kayastha et al., 2011; Mao et al., 2016)

## 2.9.2 Characteristics of Mobile Social Networks

MSN consists of three main components: users, context providers and mobile network (Kayastha et al., 2011; Song et al., 2015). Robustness in architecture, privacy and security, availability and usability contributes to popularity of mobile application. Table 2.4 summarises the common characteristics of MSN. Section 2.9.3 provides instances of MSN.

**Table 2. 4: MSN characteristics**

<b>Dimension</b>	<b>Characteristic</b>	<b>Associated key challenges</b>
Usability	Mobile devices are diverse allowing cross platform of application and also popup feature of messages. (Quan-Haase, Cothrel & Wellman, 2005).	The read/delivered receipt creates a false impression that the user is online.
Privacy and Security	Mobile devices are now fitted with sensors that can identify user's location.	Sharing of social status, routes and locations can be risky
Availability and mobility	MSN can either be available through wireless, Bluetooth or opportunistic ways. Available from any location where there is connectivity.	MSN are still plagued by resource constraint.
Communicative power and freedom	As a public domain, group chat for applications like WhatsApp allows ordinary language and disbandment of bureaucracy.	Participants feel they are all equal. May lead to leadership issues.

## 2.9.3 Instances of Mobile Social Networks

Mobile Social Network applications can be downloaded from the application stores on each smartphones depending with the operating system. In the present study, the researcher concentrates on applications that allow instant messaging functionality like WhatsApp, Facebook messenger and BlackBerry messenger as they can be vital in teaching and learning, however, there are also other applications not discussed in this study but used for the same purpose.

**WhatsApp:** Is a cross platform application which can be downloaded from the internet using personal computers or from application stores using mobile devices. WhatsApp offers a range

of services such as<sup>4</sup> voice and text messaging, one-to-one and group chat, end-to-end encryption, sharing of documents and synchronisation of messages on pc and smartphone.

The ability of WhatsApp to show online and offline modes ensures that the sender of messages can be assured of delivery. WhatsApp allows users to join groups created by anyone with their contact details. Additionally, users can join the groups through WhatsApp web links without the need for contact numbers in the phonebook.

According to Statistica (2017), the leading mobile messaging app was WhatsApp with approximately 1.2 billion users in the month of January 2017. In South Africa, Shezi (2016)<sup>5</sup> reported that out of the 26.84 million users with internet access as of January 2016, WhatsApp was the leading social platform with approximately 33% of the population who had access to the internet. Facebook was second with 30% and Facebook messenger on 20%. Although there are users who access the internet using mobile and web thereby increasing the total number of users accessing internet, the figures are quite insightful on the penetration of internet and social platforms in South Africa.

Because of popularity in South Africa, WhatsApp emerged as a potential tool for addressing the challenges posed in the current study. However, with technological advances, there is no guarantee that the status remains so for years to come. As such, any new MSN application could still be an option for future use in extending instructional time depending with familiarity with learners.

### **2.9.5 Mobile Social Networks in learning**

There is compelling evidence that mobile networks and social platforms are important in teaching and learning. Rambe and Bere's (2013) study results of undergraduate learners from a South African university doing an Information Technology module indicated the power of WhatsApp for collaboration purposes. Similarly, Reyhav *et al.*, (2016) study results of 327 groups of different social platforms drawn from five secondary schools confirm the power of converged platforms in learning.

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<sup>4</sup> <https://www.whatsapp.com/features/>

<sup>5</sup> <http://www.htxt.co.za/2016/04/29/the-stuff-south-africa-26-8-mil-internet-users-spend-most-their-time-doing-online/>

Converged networks allow access and sharing of content where there is connection irrespective of geographical location of the users (Bradley, Haynes, Cook, Boyle & Smith, 2009; Reychav et al., 2016). Notwithstanding the capabilities brought about the convergence of mobile networks, mobile devices and social computing in teaching and learning, research reports (Gikas & Grant, 2013; So, 2016) also identified challenges resulting from the technology. For instance, Gikas & Grant, (2013:23) highlighted three challenges reflected in their study:

- technology resistant of facilitators
- device issues (size, functionality and usability) and;
- associated distraction that can result from usage

However, the results from the research reports (Gikas & Grant, 2013; Ngaleka & Uys, 2013; Rambe & Bere, 2013; Reychav *et al.*, 2016; So, 2016) which used social platforms on mobile devices is quite overwhelming to confirm support of mobile devices for teaching and learning. While the researchers provide evidence, the issue of extending instructional time is not given a frontline role.

#### **2.9.6 General uses of MSN**

As earlier pointed out, learning through MSN has opportunities. First, MSN allows extension of instruction beyond the classroom or college premises. In essence, when learning content is shared outside the classrooms, instructional time is enhanced. Subsequent to collaboration is collective intelligence (Gikas & Grant, 2013:20) as learners share different ideas in a social, flexible and relaxed environment. The approach fosters authentic learning especially if lecturers are among the group to moderate the content. Collaborative learning through MSN enhances development of learner competences, skills and knowledge (Kreijns, Kirschner & Jochems, 2003). However, it sounds logical to believe that reduced participation of lecturers might be detrimental to effectiveness and impede realisation of positive outcomes of such platforms. Admittedly, learners can potentially mislead each other as well. Regardless of the rebuttal, collaboration may potentially lead to social construction of realities.

Second, MSN applications like WhatsApp conceivably fills in as a possible tool for extending formal learning. WhatsApp can be used to further discussions that occur during face-to-face interaction and discussion which occur on MSN platforms can be presented back during face-to-face interaction. This gives the opportunity of the subdued voices (So, 2016) to share without any worry because of facial absence. Rambe and Bere's (2013) study offers confirmatory substantiation on the people who are predominantly silent during face-to-face interaction. In

their study, 74% (n=57) of survey respondents suggested that they were more willing to participate on WhatsApp group in comparison to the normal class discussion. Possibly, in virtual platforms there is reduced anxiety as learners get the opportunity to know what to expect in the next classes. However, it can potentially put pressure to challenged learners in the event that they perceive the next lecture(s) as difficult.

Despite what might be expected, there is no overwhelming proof to propose that active members in class will remain so as well on discussions done using WhatsApp. Moreover, the bigger the group size, the more chances of unrecognizability and self-reluctant to participate for group members, a situation referred to by researchers (Kerr & Bruun, 1983:78; Kreijns *et al.*, 2003:339) as “social loafing effect”. Kreijns *et al.*, (2003:339) highlight three perspectives which may affect member contribution and group discussions effectiveness “free-riders/hitchhiking”, “social loafing” and “sucker” effect. The “free-rider effect” (Kerr & Bruun, 1983:79; Kreijns *et al.* 2003:339) occurs when a group member perceives that the group is doing well and sees no need to continue participating. The “sucker” effect (*ibid*) occurs when group members perceive themselves as contributing more than “free-riders”. Despite the highlighted possible group member behaviours, it is common that all initiatives will have opposing effect. Proper coordination and motivation, which in essence should be attributes of a good lecturer, may kick in under such circumstances for optimisation of the group goals.

Third, MSN applications are more likely to attract learners in comparison to traditional learning platforms like Learner Management System (LMS) because the later tends to be to formal, static repository and restricted by school policies. Instant messaging functionality which in the researcher’s opinion boosted popularity of applications like WhatsApp, Facebook Messenger, BlackBerry Messenger, to mention just a few, further strengthen the tools. Immediacy of feedback has been reported in different studies (Spencer & Hiltz, 2003; Rambe & Bere, 2013; & Bere & Rambe, 2016). It can also be argued that MSN applications are cost effective (Bere & Rambe, 2016; So, 2016) as compared to traditional Short Messaging Service (SMS). In addition, they allow rich media providing voice, text and multimedia functionality (So, 2016). Undeniably, some of these functionalities have an added cost and in some instances reduce device functionality depending with device storage capacity.

Assuming that issues related to device functionality like battery span, storage concerns and others are dealt with, MSN applications like WhatsApp are vital in fostering social relationships

and user mobility (Mao *et al.*, 2016). Notwithstanding the idea that resulting knowledge may be fragmented and disjointed, the benefits may potentially offset the challenges if well administered and monitored. From the literature reviewed in the current study, what remains uncontested is the power of MSN applications to extend instructional time.

## **2.10 Gaps in literature**

Structural intertextual coherence, problematisation (Locke & Golden-Biddle, 1997:1043; Barret & Walsham, 2004:297) and gap spotting (Sandberg & Alvesson, 2011) techniques have been used in identifying shortcomings of the reviewed literature.

### **a) Instructional Time**

First, the literature reviewed is not conclusive (non-coherence) on which type of instructional time offers more positive results on learning efficiency. The difficult question lies in identifying which of the instructional times had more impact on achievement. While Carroll's (1963) study epitomises the importance of instructional time in learning, Gettinger's (1989) studies documented that similar amounts of instructional time did not produce the same results in student achievement and retention scores. Karweit (1985) refuted the claim that instructional time is the biggest contributor in performance based on complexity of measure. Fredrick and Walberg (1980) argued that instructional time is so complex to measure. The unit of analysis in previous studies on instructional time varied from class average, grade average and school average posing inconsistencies in results.

Second, the studies reviewed appear to ignore other perspectives of time. Sandberg & Alvesson (2011) used the term neglect spotting to refer to a situation where only one perspective is considered whilst other perspectives are left behind. Given, different perspectives used to investigate the different instructional time, it is problematic to generalise the results yet alone particularise them to NCV context. Significantly, literature does not explicitly state from which perspective the instructional time concept viewed but critical analysis seems to point towards one perspective of clock time only.

Subsequently, the perspectives used appear to have influenced the research methodology of most of the literature reviewed on instructional time. Most studies on instructional time used quantitative methods limiting qualitative voice of the participants. The proposed study will use mixed methods approach for data collection and analysis for better inferences.

Although research on instructional time has been carried out over the past five decades, not a single type of instructional time has been agreed upon to be contributory in learning efficiency. Research results on instructional time are not conclusive, thus making effects of the different types of instructional time difficult to predict with certainty. Moreover, most of the data collected from instructional time studies was collected from primary or secondary school learners studying either numeracy or literacy subjects: a set up diverse from the TVET sector.

**b) Learning efficiency**

Most of the studies in learning outcomes appear to concentrate on interventions within the school or college perimeter. Insightful as the data is, reviewed studies suffer from incompleteness (Sandberg & Alvesson, 2011). Despite attempts to address learning efficiency challenges within TVET sector, very few studies seem to emphasize the importance of informal learning. Learning is a social practice which can be strengthened through casual learning. Concentrating on achievement works well for ‘statist model’ of education which are supply driven rather than demand driven in terms of labour. It is therefore suggested in this study that learning efficiency should be looked at from three angles: knowledge, skill, and competence for sustainable development in global economies. All things being equal, informal learning enhances social skills like communication, emotional and interpersonal skills which the labour markets want (Papier *et al.*, 2016).

**c) Mobile Social Networks**

All but one of the literature works reviewed in this study on MSN mention instructional time. Rambe and Bere (2013) mention the extension of instructional time but do still not recognise the construct as key in their study. The proliferation of MSN expresses the need for research which deals with instructional time discourse interfaced by MSN. It is increasingly apparent from the literature that MSN usage for pedagogical optimisation will keep on assuming a significant role in institutions of higher learning.

Apart from Abadzi’s (2009) and Benavot and Gad’s (2004) studies, the reviewed literature on instructional time lack African context with majority of the studies (Caldwell et al.,1982; Karweit, 1985; Gettinger, 1989; Berliner 1990; Cuban, 2008) conducted in societies with different culture, social, political and economic setup different to that of developing countries. The current study balances off with data from South African TVET colleges which are unique in purpose, implementation and demographics in comparison to those found in America and

Europe. In addition, the studies which looked at instructional time were conducted before the entry of Mobile Social Networks in learning. The researcher believes research on instructional time using Mobile Social Network tools is warranted and likely to provide positive contribution towards learning efficiency not only in TVET sector.

In light of the gaps identified in this section, it is proposed in the present study that the omissions can be potential opportunities for practical and theoretical contribution. Section 2.11 presents a summary of the discussion presented in the current chapter.

## **2.11 Chapter Summary**

The present chapter outlined how learning efficiency impacts the success of TVET programmes. Learning efficiency was described in its three dimensions: i) knowledge, ii) skills, and (iii) competence. Because the South African TVET sector is regarded as underperforming, the literature explained several possible causes which contribute to the challenges and how the South African government has attempted to overcome the highlighted issues. What has not been indicated in the literature is instructional time despite key sources highlighting the importance of time in the learning process (Carroll, 1963; Bloom, 1974; Berliner, 1990).

In light of the increase in use of technology for the learning process, MSN have been suggested to assist in extending instructional time outside the allocated time. Since learning is well supported in social settings (Nonaka & Takeuchi, 1995) the suggested tools have been put forward as tools which all stakeholders can take advantage of to contact learners in their comfort zone. In so doing instructional time is extended beyond the allocated time.

Despite the criticism levelled against MSN, the literature discussed is cognisant of the fact that they are powerful tools since they offer immediacy of feedback (Spencer & Hiltz, 2003), triggering conversation with the muted voices”, user mobility and heterogeneity of smartphones (Mao *et al.*, 2016). It has been highlighted how collaboration assists in improving social competences like team work, communication while improving skill set. Thereafter, the literature explained how Human Capital Theory (HCT) assists in evaluating return on education and training inputs, of which instructional time, a key aspect in the study is one. Chapter Three discusses the conceptual framework.

## **CHAPTER THREE: CONCEPTUAL FRAMEWORK**

### **3.0 Introduction**

The current chapter is organised in the following sections: Conceptual background (3.2); Framing logic of inquiry (3.3); Learning theories (3.4); Attributes of the conceptual framework (3.5); FRAME model (3.6); Synthesis of key theories (3.7); Building the Mobile Social Network Framework (MSN) (3.8); and Conclusion (3.9). From the literature consulted, the ideas on instructional time, MSN and learning efficiency are disconnected. Literature reviewed did not present a theoretical or conceptual framework which is applicable in the current context, hence proposing one has been set as one of the objectives. Available frameworks and models offer insufficient lenses for addressing the inquiry. Literature presented in this study guided the development of a conceptual framework and refinement became an on-going process.

### **3.1 Conceptual Framework Background**

Miles, Huberman and Saldaña (2014:20) define conceptual framework as “either graphically, or in narrative form, the main things to be studied – the key factors, variables or constructs and the presumed interrelationships among them”. The conceptual framework sets the research map connecting literature, research questions, research design methodology and analysis and conclusions. Creswell (2003) suggests that a conceptual framework guides the selection of philosophical perspectives, research strategies and research methods. Given, graphical representations are simple to understand since they form powerful instances of expressing one’s view. Nonetheless, Ngwenyama (2014) contends that the symbols used to represent researchers’ logical reasoning do not necessarily equate to reality themselves. Instead, research can only affirm conformity to what the symbols represent as per researchers’ thinking. In the present study, a visual portrayal was created from literature and refined as the research progressed.

One of the greatest challenges associated with using MSN for instructional purposes has been the lack of a comprehensive framework encompassing the learner-lecturer aspect, contact style, MSN affordances, instructional time awareness, learning efficiency, MSN challenges and interventions. For instance, available frameworks such as the Pedagogical framework (Park, 2011), Conversational framework (Laurillard, 2002), and many others do not share explicit views on the impact of extending instructional time. It is suggested in the current study that absence of an integrated framework to guide lecturers creates a knowledge desert on current phenomena under study since users are more likely to feel ambivalent in use of the technology.

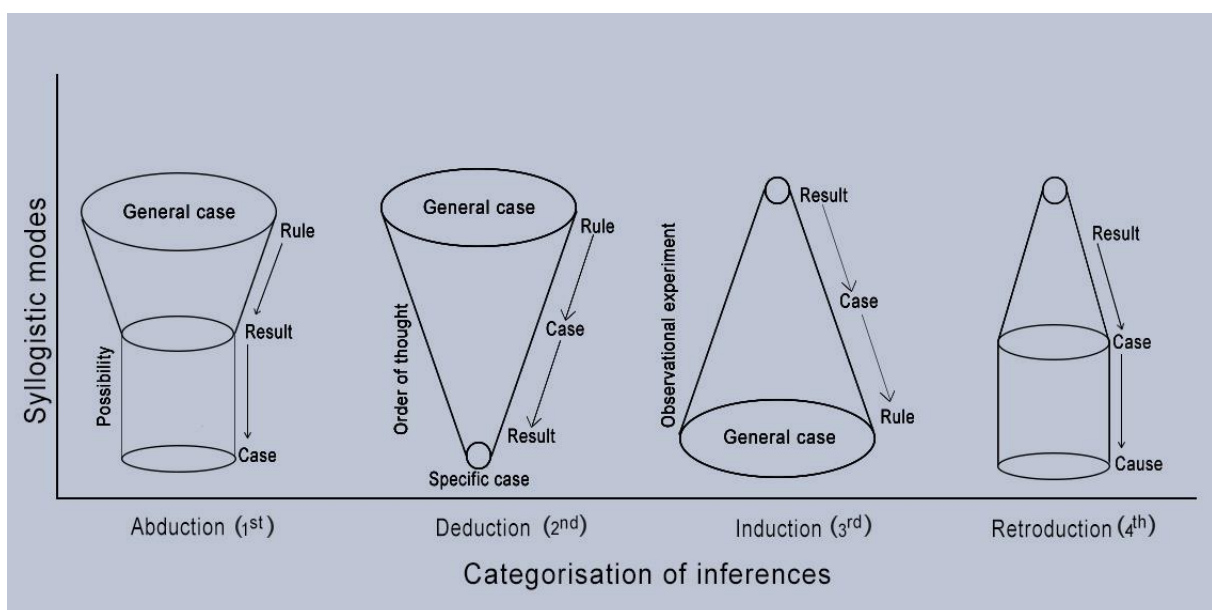
Potential users may see an opportunity, but absence of the guiding framework complicates the idea. Regardless of the existing frameworks consisting of parts of the argument, they are weak in the context of the current study. Consequently, blending concepts from the available frameworks is expected to reveal more insight into how lecturers and learners may utilise MSN for extending instructional time.

Although mobile learning is not the focal point of the present investigation, learning utilising MSN applications such as WhatsApp for learning purposes is regarded in this study as a potential in extending instructional time. Mobile learning frameworks have concentrated on mobile affordances. Insightful as it may be, lecturer presence as suggested in early literature (Tagg & Dickinson, 1995; Garrison, Anderson & Archer, 1999) on learning outcomes continues to be absent. It is argued in this respect that frameworks reviewed in this study concentrate more on the mobile device aspect rather learner-lecturer aspect as well for extending learning. For instance, Park's (2011) Pedagogical framework was considered but fell short in explaining the impact of extending instructional in polarised MSN environments. Moreover, the Pedagogical framework is believed to be more appropriate for learners with great expertise. On account of the NCV challenges, where lecturers have to deal with issues of discipline and learners of different cognitive abilities (Powell & McGrath, 2013; Blom, 2016), the Pedagogical framework might not be the best alternative framework to be used for their set-up as most of the learners lack expertise.

Another framework considered in this study was Laurillard's (2002) Conversational framework. Laurillard (2002) asserts that best teaching and learning outcomes are as a result of adoption, discussion, reflection and interaction. The Conversational framework focuses more on technology provision in the learning space to allow learners develop models for problem solving through collaboration. The use of technology in the framework is seen as providing support and strengthening learner autonomy. Although the Conversational framework has been applied in learning with digital technologies, it does not emphasise instructional time as a critical factor in learning. Having highlighted a brief summary of the Conceptual framework, understanding of logic of inquiry is provided in the next section (3.2) since it provided the researcher with the basis of reasoning and theory construction. The next section outlines the types of logic associated with inquiry making.

### 3.2 Framing logic of inquiry

Understanding logic of inquiry is of great importance to guide the researcher in adopting specific research designs (Miles *et al.*, 2014). Researchers (Staat, 1993; Plutynski, 2011; Ngwenyama, 2014) suggested four types of inferences which can be used in theorising as: ‘abduction’, ‘deduction’, ‘induction’, and ‘retroduction’. Figure 3.1 shows categorisation of inferences as suggested by Staat (1993). Abduction inference uses possibilities in its attempt to explain and analyse the knowledge logic. Deduction is a type of reasoning which starts with a rule followed by case and result. Induction starts with result, then followed by case and rule. Retroduction consists of result, case and cause as its syllogistic perspectives.



**Figure 3.1: Categorisation of Inferences**  
(Source: Adapted from Staat, 1993)

According to Pierce’s thinking, abduction, induction and deduction are categorised into “First, Second, and Thirdness” respectively (Staat, 1993:225) though the latter two have been interchanged in some instances. Additionally, Pierce did not at first categorise retroduction within the early writings, and for the purposes of this study it is assigned to the Fourthness category. It is suggested in this study that retroduction inference would work well for explanatory inquiries rather than prescriptive studies.

This study adopts s Pierce’s abduction as a form of reasoning to an inquiry since it is not hindered by rules of logic (Plutynski, 2011), offers genuine opportunities (Staat, 1993) to an inquiry treating reality as what works. Output of abduction reasoning can either be propositions or hypotheses. Propositions trigger further inquiry through logical criticism and testing to assert

its acceptance or rejection (Lee, 1991; Popper, 2002; Ngwenyama, 2014). Any inquiry whose hypothesis or proposition fails to survive logical criticism is likely to remain in academic wilderness. As long as a theory offers further platforms worth discovering, its credibility is strengthened. Consistent with Pierce's thinking, abduction cannot be separated from pragmatism, a philosophical assumption adopted in this study. Moreover, abduction appears as cycles of deduction and induction catering for any strength of the other.

Clarke (1974:66) views abduction as "an educated guess" or "intelligent conjecturing". Although abduction resembles induction as both lead to hypothesis, abduction starts with no theory but facts (Clarke, 1974). Facts can be a result of totalling propositions followed by observations and resulting in careful judgement (Kapitan, 1990). Using Pierce's abduction inference, the argument in this study is as follows:

Rule:	All learning needs time;
Result:	Learning efficiency is timed; and
Case:	Therefore, extended instructional time increases learning efficiency.

In the current context, the propositions are pre-suggested in the research design and tested deductively from the whole data set in Chapter Six.

Although abduction faces challenges of boundary (Staat, 1993; Plutynski, 2011), this study remains firmly guided by the research question: "can-be's" rather than "would-be's" (Staat, 1993:231). The study uses the data collected from the empirical setting to explain and validate the generated propositions as compared to induction inference, which is believed to be credible only for classification purposes (Plutynski, 2011). Another important aspect vital for setting up learning initiatives is an understanding of learning theories.

### **3.3 Learning Theories**

Learning theories are used as foundational theories followed for the purposes of bringing changes in understanding. Sound knowledge of learning theories is crucial for pedagogical optimisation, incorporation of instructional strategies and prediction of outcomes (Ertmer & Newby, 2013). In that respect, learning theories such as behaviourism, cognitivism and constructivism were also interrogated in the process of selecting a conceptual framework. Because of the incompleteness and inadequacy (Locke & Golden-Biddle, 1997) of these

existing theories to sufficiently explain knowledge, skill and competence development required for NCV learners, the present study sought to develop a conceptual framework showing coherent concepts of connectivism learning theory for achieving learning efficiency. A comparative of the different learning theories has been presented (see Appendix 10).

While the explanation presented in Appendix 10 reflects a philosophical and a psychological perspective on how people learn, at the very abstract level, the explanation gives an understanding of how people can acquire knowledge through each of these. Learning theories can assist educators in constructing the best learning environments together with appropriate instructional methods (Grassian & Kaplowitz, 2009). Given the fact that learning is observed largely through “products or outcomes” (Schunk, 2012:4), observable changes in knowledge, competence and skills provide key components in assessing outcomes. Despite notable non-coherence, the current study attempts to justify the choice of connectivism as the appropriate learning theory for collaboration within MSN environments. Section 3.4 discusses the attributes of the conceptual framework.

### **3.4 Attributes of the Conceptual Framework**

This study is largely guided by the work of three theorists: Vygotsky’s (1978) Zone of Proximal Development (ZPD), Siemens’ (2004) connectivist theory, and Koole’s (2009) ‘Framework for the Rational Analysis of Mobile Education’ (FRAME) for the purposes of improving learning efficiency. While the researcher employs concepts from all three, aspects of each are not adopted in their entirety while seeking to develop a framework because they are not particular to the problem experienced within the TVET sector.

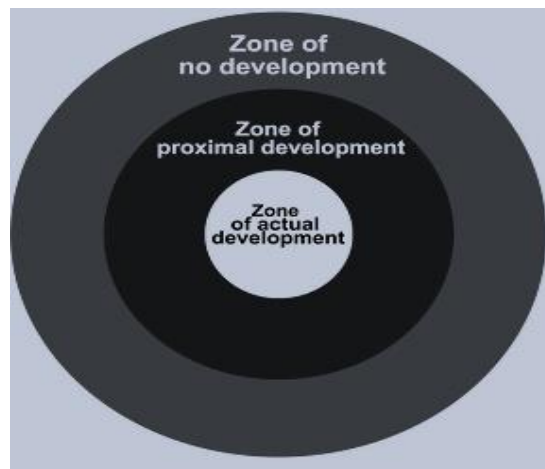
### **3.5 Zone of Proximal Development: A non-fading concept**

#### **3.5.1 Background of ZPD**

The term ‘Zone of Proximal Development’ is a key concept towards framing the conceptual framework in this study simply because of the key notion that learners can perform more through imitation when given assistance (Vygotsky, 1978; Chaiklin, 2003; Schunk, 2012). Vygotsky (1978:86) defines ZPD as:

The distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers.

Figure 3.2 shows the three zones arising from collaborative environment such as Mobile Social Network. Zone of Actual Development (ZAD) shows knowledge already acquired and as such can be regarded as retrospective. ZPD shows capability of what learners can achieve — prospective development (Vygotsky, 1978). ZPD is therefore a region in which learners would be able to perform tasks which they cannot do on their own because of complexity (Schunk, 2012). Zone of No Development (ZND) is the region where learners may not learn anything, even with support, either due to complexity, disruption or lack of concentration or lack of support. The middle zone (ZPD) is the one in which this study is more interested.



**Figure 3. 2: Zone of Proximal Development**

The more capable peers may be lecturers or fellow learners who are able to assist learners to perform the tasks. Nonetheless, it is not the more capable peers who are more important. Individuals must bring their own experience for the purposes of connecting and deducing patterns too (Chaiklin, 2003). Social network tools such as MSN facilitate the sharing of knowledge between individual and group members (Gunawardena, Hermans, Sanchez, Richmond, Bohley & Tuttle, 2009). Through collaboration using MSN, learners have potential to move from ZPD to ZAD with ease. Gunawardena *et al.* (2009) found out that learning through technology facilitates learners to reorganise and reflect on their ideas while accepting a multiplicity of views. It is, therefore, argued in the present study that when learners perform tasks on their own, learning efficiency potentially improves.

### **3.5.2 Challenges to Zone of Proximal Development concept**

Researchers (Chaiklin, 2003; Schunk, 2012) critique Vygotsky's work in general on the basis that the majority of the work was translated. Possibilities of meaning being lost during the translation process cannot be disputed. Furthermore, in most cases, ZPD has been used together

with other theories, such as scaffolding (Tudge & Scrimsher, 2003), leaving it with a supporting role.

Despite the noted controversy in Vygotsky's work, ZPD remains a strong concept applied in several aspects in learning. ZPD assists in explaining how learners acquire knowledge, skill and competences through apprenticeships. A learner working under the mentorship of experienced workers benefits through working together. This typically resembles the apprenticeship model or learnership model where learners are assigned to experienced mentors during the course of the programme. Although in the case of NCV programme, there is no apprenticeship facility, social network tools can be used to constantly stay connected to the learners for easy access of help when required. Schunk (2012) highlights that peer collaboration allows learners to wait for each other during discussion until they are all at the same level of cognition or mastery and then proceed to the next task.

Resonant with the idea of "more competent others" (Chaiklin, 2003:52) within mobile learning environments, ZPD concepts become one of the underlying principles in the development of the MSN conceptual framework. Moreover, the link between the concept of connectivist learning theory and social constructivism theory by Vygotsky which puts emphasis in ZPD, cannot be underestimated. Nevertheless, ZPD alone as a theory cannot adequately explain learning which takes place in MSN environments. In constructing MSN conceptual framework, the concept of ZPD is adopted as per above explanation.

### **3.6 Connectivism: A learning theory in digital environments**

#### **3.6.1 History**

George Siemens introduced 'connectivism' as a learning hypothesis in the year 2004 and was later supported by Downes (2007). Siemens (2004) contends that the conventional learning theories such as behaviourism, cognitivism and constructivism fall short of explaining knowledge that arises from connections. Additionally, 'traditional learning theories' best explains learning occurring in a linear format in contrast to connectivist learning environments characterised by chaos and networks (Siemens, 2004). It is argued here that learning environments characterised by technology are typically non-linear in nature and synonymous with chaos. It is, for that reason, essential for learners to be able to identify hidden patterns arising from chaos. Even though critics of connectivist theory argue that identifying the patterns

is a skill requiring cognitive ability, the learning environments are well supported with “more competent others” (Chaiklin, 2003:52) who will assist the learner.

### 3.6.2 Overview of the connectivism theory

Learning is activated when learners connect, share, interact and collaborate with members of a network community. The presence of “more capable others” (Vygotsky, 1978) — who in the case of TVET systems could be lecturers and other learners who may be subject experts — enhances movement to ZPD. Under connectivism, Siemens (2004) asserts that the amount of knowledge keeps increasing due to abundant use in technology that serves as a source for up-to-date information. Failure to keep up to date with knowledge leads to shrinkage of knowledge volumes (Siemens, 2004). This study suggests that informal learning environments such as MSN-enabled have the potential to deal with the shrinking knowledge as communication through networks increases the chance of acquiring new knowledge.

### 3.6.3 Principles of connectivism learning theory

Siemens (2004) explains how knowledge can be acquired within technology-mediated environments. Table 3.1 presents the fundamental principles of connectivism as suggested by Siemens (2004).

**Table 3. 1: Principles of a connectivist environment**

<b>Key ideas</b>	<b>Explanations</b>
<ul style="list-style-type: none"> <li>• Diversity of opinions.</li> </ul>	The strength of suggested MSN communities lie in the multiplicity of knowledge they offer and flexibility of connections (Goldie, 2016).
<ul style="list-style-type: none"> <li>• Knowledge can exist in non-humans; for example machines.</li> </ul>	Awareness on where to find information is vital
<ul style="list-style-type: none"> <li>• Currency of connections</li> </ul>	Nodes with up to date information are more reliable and more likely to grow bigger (Siemens, 2004).
<ul style="list-style-type: none"> <li>• Identifying key nodes is crucial.</li> </ul>	Identifying crucial nodes for the building stronger networks (Goldie, 2016). In the current context, these could be the lecturers or the more capable learners.
<ul style="list-style-type: none"> <li>• Networks, chaos (Siemens, 2004); openness and self-organising (Goldie, 2016)</li> </ul>	Because MSN environment is social, group members are free and there is a possibility of chaos.

(Source: Siemens, 2004; Goldie, 2016)

### 3.6.4 Criticism of Connectivist theory

First, connectivism has been criticised on the grounds of philosophical deficiency (Verhagen, 2006). Although the influx of technology has shaped how humans can acquire knowledge through connecting to appropriate databases or connections, connectivist proponents do not explain how people 'come to know' (Clara & Barbera, 2013); however, the concept of

distributed knowledge (Downes, 2007) as suggested by connectivists is not well accepted. Downes (2007) responded by arguing that knowledge results from connections which may not mean language and logic instead of experience or recalling. According to Kop and Hill (2008), knowledge-making and transfer is a grey area under the connectivist perspective. Given the abundance of knowledge which is largely available on networks, knowledge-making might no longer be necessary as long as one knows where to find the knowledge when needed.

Second, connectivist theory is criticised on the basis that it brings nothing new which traditional learning theories has never mentioned (Verhagen 2006; Kop & Hill 2008; Clara & Barbera, 2013; Goldie, 2016). While accepting that knowledge may reside in machines or databases, educators can also possess the knowledge obtained through experience or recalling. Since learning is a social act, communication is, therefore, fundamental for the learning process to thrive in connectivist environments. For the stated reason, proponents of conventional learning theories dispute that connectivism is not a learning theory, but rather a revised edition of constructivism only put forward to fit the technology dominated learning environments.

Third, connectivist perspective assumes that as long as there is a network, there is learning. It is possible that some of the nodes could be hitchhikers (Kerr & Bruun, 1983; Kreijns *et al.*, 2003). As such, it is a weak premise to oversimplify the fact that communication is quite obvious simply because of the existence of a network (Verhagen, 2006; Dunaway, 2011; Clara & Barbera, 2013; Goldie, 2016). Needless to say, ability to identify the connections is a skill which cannot be oversimplified.

Furthermore, connectivism has been challenged on lack of strong empirical analysis apart from its application in Massive Open Online Courses (MOOCs) platforms such as Lynda.com, OpenUpEd, Coursera (Steffens, 2015; Goldie, 2016). MOOCs have been characterised by high dropout rates and also weak results, too much so to strongly suggest effectiveness of connectivism. There is doubt in the depth of engagement taking place as people are more likely to connect to those who share the same sentiments (Verhagen, 2006). A group member might refrain from criticising a fellow member's ideas, fearing isolation. Acknowledging the criticism, it is possible to suggest that the major articles on connectivism by Siemens (2004) and Downes (2007) are criticised since they are not found in academic databases and may not have gone through thorough peer review. Nonetheless, connectivist approach underpins an insightful

aspect of how learning takes place in a social technology-dominated environment in terms of diversity of opinions, ownership and social collaboration.

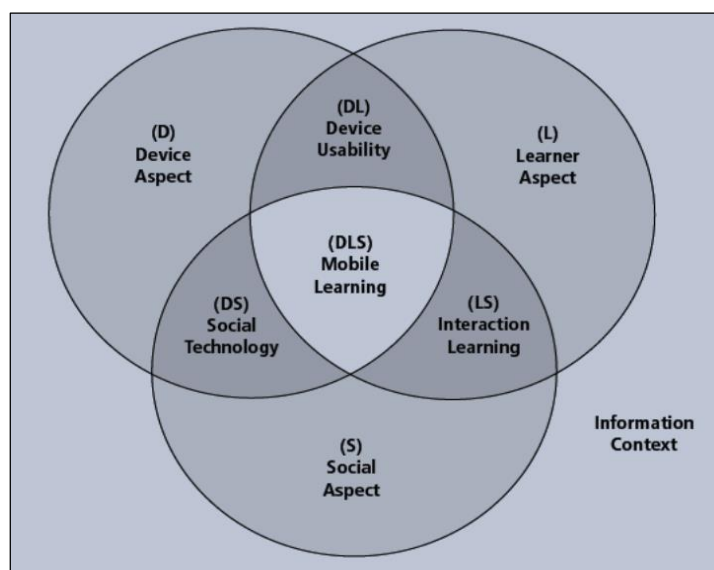
Moreover, the process of acquiring learning should not be seen in one view. It is possible that several perspectives can be used to explain learning systems (Tam, 2000). Perhaps, it can be argued that each learning theory explains learning acquired at different stages. As asserted by Goldie (2016), the argument poses another challenge as to the stage at which each learning theory should be introduced. Since technology seems to be playing a major role in how the 'Net generation' learn, connectivism could be an outstanding perspective. It is, therefore, suggested in this study that new learning environments require a new learning perspective and the stage at which the perspective can be introduced depends on learners' familiarity with technology.

Despite the criticism levelled against connectivism, it seems convincing that connectivism helps to extend instructional time. In addition, connectivism strengthens learner-lecturer contact, a key concepts cited as a weakness of FRAME model discussed in the next section.

### **3.7 Revisiting Framework for the Rational Analysis of Mobile Education (FRAME)**

The FRAME model devised by Koole (2009) is one of the contributing frameworks for understanding the current study because of its key constituencies: device, social and learner aspect. The concepts forming the FRAME model are fundamental to knowledge acquisition resulting in mobile social learning environments. Both the FRAME (Koole, 2009) and Community of Inquiry (CoI) framework (Garrison et al., 1999) share some resemblance to each other. The structure of the FRAME looks similar to that of CoI in the sense that learning is as a result of teaching, cognitive and social contact, but differs on constituencies.

In its revised form, FRAME comprised of "Device aspect (D)"..., "Social Aspect (S) ...." and "... Learner Aspect (L)...", with mobile learning (DLS) centrally positioned (Koole, 2009:63), as shown in Figure 3.3.



**Figure 3.3: FRAME Model**  
(Source: Koole, 2009)

### 3.7.1 Applicability of FRAME elements

#### a) Device Aspect

“Device Aspect” denotes the physical structure of the mobile device and its associated characteristics (Koole, 2009:63). It is suggested in this study that mobile devices with improved physical capabilities increase usability and participation of users in online environments. However, in the current study, the device aspect is not given much attention since the majority of smartphones cater for most of the common functionalities.

#### b) Learner Aspect

“Learner Aspect” sector refers to learner attributes, and these include motivation, cognitive abilities, and memory capability (Koole, 2009:63; Koole, McQuilkin & Ally, 2010). Prior knowledge in learners is used in constructing cognitive structures rather than simply discovering. It is at this stage where the lecturers become more important in assisting learners to construct meaning in the ZPD. This study, therefore, considers the lecturer an important component in the inquiry process. Positive acknowledgment of learners’ response by a lecturer potentially helps to increase student activity (Tagg & Dickinson, 1995). If Koole (2009) assumed that it is obvious in any cognitive collaboration process to have facilitator presence, needing no major focus but total silence, this puts the model under scrutiny. According to Garrison et al. (1999), key components in any learning process are the learners and lecturers. This argument leads a new concept called the ‘learner-lecturer aspect’. Although not all lecturers’ behaviours might be consistent with learner activity in MSN environments, their presence may potentially lead to critical engagement.

### c) **Social Aspect**

‘Social Aspect’ is defined as “social rules governing conversation and cooperation among people” (Koole *et al.*, 2010:63). Communication rules help to strengthen social networks. Stronger networks are thus more reliable and likely to grow, and this is also synonymous with connectivist theory. The computing power of mobile devices such as smartphones offers increased social presence through its capability of text, voice and video provision. Such functionalities offer high social presence and can attract more users with a possibility of building stronger networks essential for educational optimisation. However, if technology is not well structured, the outcomes could be negative to the learning process. For the stated reason, the current study suggests the importance of the lecturer aspect as key in enforcing rules or policies and moderating the online discussions that occur during informal learning. Nevertheless, social setting fosters cognition (Garrison *et al.*, 1999), diversity and openness (Siemens, 2004). Persistent with social collaboration is a connectivist perspective of negotiating meaning rather than constructing meaning, the researcher includes social affordances in the new MSN framework.

While the FRAME model has been applied in mobile social learning environments (Rambe & Bere, 2013), though at university context, this study argues that the research did not shed much light on the learner-lecturer aspect. Hence, the model cannot be used as the outright structure because of limitations on exhaustiveness in concepts, for instance, absence of the lecturer. The FRAME model appears silent on the lecturer aspect as envisaged in the other technology-mediated studies (Tagg & Dickinson, 1995; Garrison *et al.*, 1999). Lecturers are responsible for making sure that critical engagement takes place in any learning environments while being conscious of instructional time. The current study, therefore, derives its concepts such as the learner-lecturer aspect and mobile affordances from FRAME. Consistent with the argument of this study, another striking feature also absent in the FRAME model is the idea of extending instructional time. The only mention of a time concept in the FRAME model is ubiquitous access of learning content anytime. This study, therefore suggests adding instructional time as a concept.

### **3.8 Synthesis of Key Theories**

The FRAME model and connectivist theory provide fundamental insights in which the proposed study is positioned. Key elements identified in FRAME, such as learner, device and social aspect, are all important in understanding the mobile learning environment. The greatest

concern identified on the FRAME model is the omission of the lecturer, a gap which the current study seeks to close, as reflected in the literature. Studies which highlighted the potential disruptive nature of social networks (Cramer & Hayes, 2010) suggest presence of teachers within networks as a solution to manage learner diversity and critical peer collaboration. Despite some scholars (Ewbank, Foulger, & Carter, 2010) drawing attention to teachers misbehaving on the social networks, the platforms provide spaces where the learner-lecturer relationship can be adopted for educational progression (Nowell, 2014). Although separately, the theories discussed in the present chapter appear to lack comprehensiveness as per current study context, the concepts, when combined and modified, provide a balanced understanding together with emerging themes from data collected in the study. The final framework is presented in Chapter Six.

### **3.9 Building the Mobile Social Network Framework**

As shown in Figure 3.4, the key concepts which are anticipated to strengthen the MSN learning environment are the learner-lecturer aspect, MSN affordances (collaboration, context, diversity, learner autonomy and imitation), challenges and learning efficiency. Additional themes will be added as they emerge during the process of data collection.

#### **3.9.1 Concepts of MSN framework**

Combined theories of ZPD, connectivism and FRAME resulted in three major categories of variables. These are the Learner-Lecturer aspect, MSN affordances (Mobile Social affordances and Mobile Device affordances), and learning efficiency. Lecturer and learner have been recognised as key components in a learning environment (Garrison *et al.*, 1999). Learning efficiency is foreseen as the expected outcomes of the initiative. Extended instructional time is considered as an element availed through both the mobile device and social affordances. Collaboration, openness, diversity, instructional scaffolding and context are considered as sub-properties of MSN affordances concepts emphasising communication which takes place between the learners and lecturers within a MSN environment.

With regards to the present examination, the MSN conceptual framework embraces the idea that extending instructional time may assist in influencing learning efficiency. Although the extraneous variables of mobile data and device usability may affect the outcome of the initiative, it is expected that the lecturers can always find alternatives to deal with such issues beforehand. The impact of extraneous variables may likewise reveal insight into the effect of

mobile data costs in South Africa, nonetheless, this is outside the extent of the present investigation. In Figure 3.4, arrow 1 and 2 suggests the collaboration between learner and lecturer using an appropriate contact style. Arrow 3 and 4 highlights the importance of contact style in a formal learning environment and informal learning environments. Arrow 5 suggests the user perception and possibilities of Mobile Social affordances. Arrow 6 and 7 represents the expectations from formal learning environments.

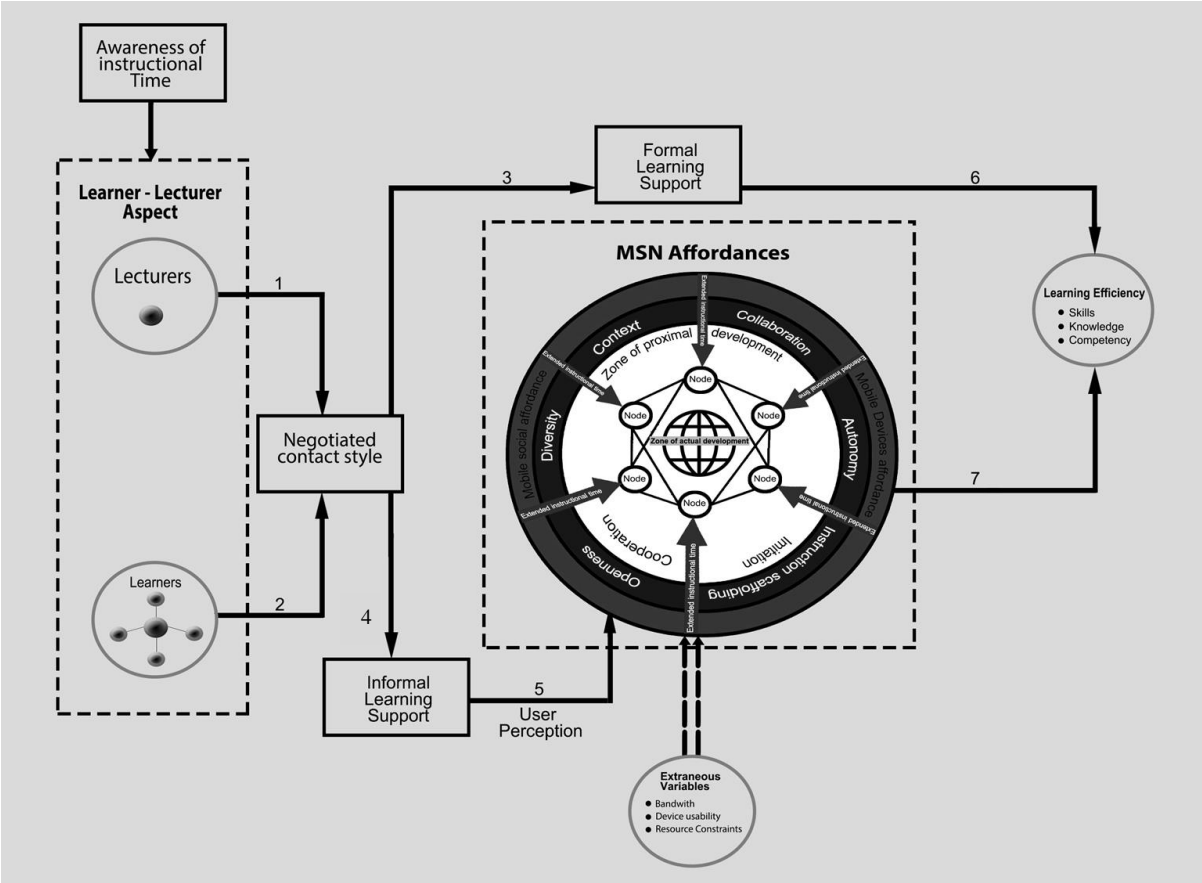


Figure 3. 4: Preliminary Mobile Social Network Framework

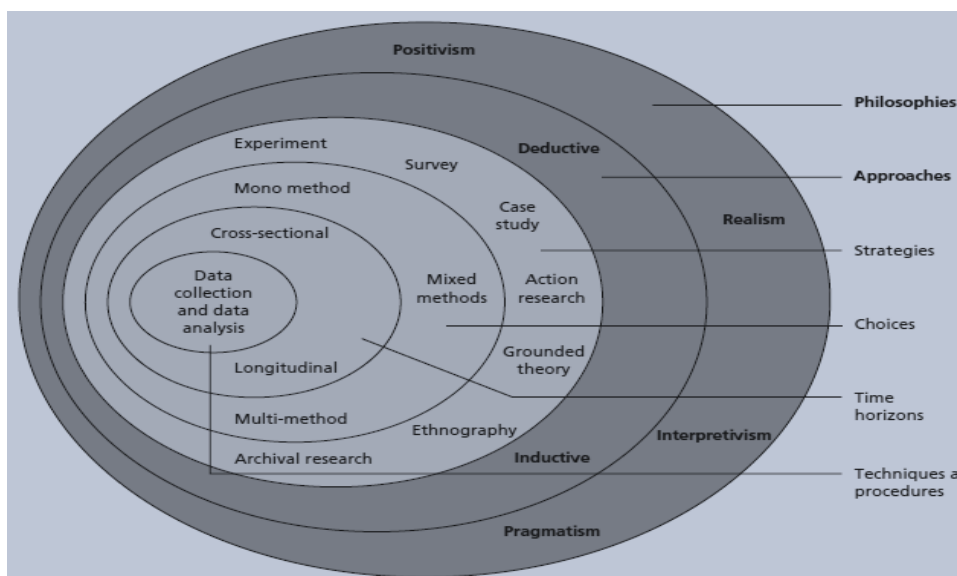
### 3.10 Conclusion

Taking into account the literature presented in this study, an integrated prescriptive framework Refinement of the proposed framework was done using data from the empirical setting. In Chapter Four, the research methodology and procedures are outlined.

# CHAPTER FOUR: RESEARCH METHODOLOGY AND PROCEDURES

## 4.0 Introduction

The current chapter discusses the related methods and methodologies implemented in the study in an attempt to answer the research question. The linkage between the evidence collected and the associated processes employed in collecting and analysing data is accomplished through careful consideration of researcher’s worldviews and assumptions. Crotty (1998) identified four key components to research: epistemology, theoretical perspectives, methodology, and methods. A significant difference with other researchers such as Saunders, Lewis and Thornhill (2009) is the separation of epistemology from philosophical assumptions. The current study uses philosophical assumptions to embrace all tenets, for instance epistemology, axiology, and ontology. Any of the choices that the researcher makes is selected from the six categories, with each represented by an oval shape as identified in Figure 4.1. Equally important, though omitted by Saunders *et al.* (2009) as reflected in Figure 4.1 is ethical consideration, which must be addressed by researchers dealing with human subjects. The study adopts pragmatism as the paradigm of choice, participatory action research as the strategy using mixed method. Analysis of test scores, documents (attendance registers), lecturer and learner interviews and questionnaire responses show learners form part of data collection instruments. The adopted stances were used to uncover the potential of extending instructional time towards learning efficiency utilising MSN.



**Figure 4. 1: Research alternatives**  
(Source: Saunders *et al.*, 2009:108)

The layout of the current chapter is as follows: 4.1 Research philosophy; 4.2 Research paradigms; 4.3 Research strategies; 4.4 Research choice; 4.5 Data collection technique adopted; 4.6 Theoretical propositions; 4.7 Participatory Action Research; 4.8 Sampling; 4.9 Quantitative analysis; 4.10 Qualitative analysis; 4.11 Ethical issues; 4.12 Data management and section 4.12 provides the Chapter summary.

## **4.1 Research Philosophy**

For the purposes of enhanced comprehension of research philosophy, the two terms (research and philosophy) are defined separately and then combined to obtain a fused meaning. The term 'research' refers to a systematic scientific inquiry aimed at expanding knowledge through collecting and analysing data (Hussey & Hussey, 1997; Saunders, Lewis & Thornhill, 2009; Leedy & Ormrod, 2010). Crucial to the definition are the terms 'systematic' and 'expanding knowledge'. Any type of research seeks to find solutions or truth to societal problems through scientific ways. According to Cohen, Manion and Morrison (2007), truth can be uncovered through three different processes: reasoning, research or experience. Consequently, researchers' claims are only refuted or accepted as truth after systematic and logical reasoning (Popper, 2002, Ngwenyama, 2014) reached through careful collection of data and analysis.

Assuming that a systematic scientific inquiry has been followed throughout, the process is expected to give answers to societal and educational problems giving rise to new knowledge. In some instances, if claims are not well supported, the process triggers more research in search of acceptable knowledge. Nevertheless, universal truth can only be regarded as such in the minds of those who set up the standards (Ngwenyama, 2014).

The term 'research philosophy' gives a full understanding of how the scientific inquiry is carried out in the "development of knowledge and the nature of that knowledge" (Saunders *et al.*, 2009:107). How the researcher carries out the inquiry is largely determined by the philosophical assumptions. While the adopted philosophy might appear to be hidden as the researcher carries out the inquiry, the order, methods and techniques implemented still reflect and position the research within specific assumptions. Sections 4.1.1- 4.1.3 discuss three major ways to view philosophical assumptions; these are epistemology, ontology, and axiology.

### 4.1.1 Epistemological assumptions

Epistemology deals with what constitutes knowledge in research. The term is used to refer to what the researcher respects as binding knowledge. As suggested by Hussey and Hussey (1997:49) “epistemology is concerned with the study of knowledge and what we accept as being valid knowledge”. An understanding of the different epistemological stances assists in positioning researchers’ orientation in relation to what is being researched. Blaikie (2010:94) identifies six categories of epistemological assumptions, as explained in Table 4.1.

**Table 4. 1: Epistemological categories**

<b>Viewpoint</b>	<b>Key principles</b>	<b>Strength (S) /Weakness (W)</b>
Empiricism	Knowledge and ideas are derived from sense perception. Reject innate knowledge principle	S-Used in approving or disapproving theories. W- Human perception is undependable.
Rationalism	Knowledge is acquired through reason. Characterised by deduction, innate ideas and maths.	S- Explains well knowledge attained without any foundation in evidence. W- Tendency to disregard facts.
Falsificationism	Hypothetico-deduction (Lee, 1991; Popper, 2002; Hjørland, 2005) for knowledge attainment. Researchers’ ontology is more of a cautious realist (Blaikie, 2010).	S- Reduced bias as researchers attempt to negate what is known. W-Demarcation on what is or what is not theory is suspect (Chalmers,1999)
Neo-realism	Behaviour is determined by physical or organisational mechanisms. Depth realist ontology shapes neo-realist researchers.	S- provides all possible alternatives (empirical, real and actual domain)
Constructionism	Meaning is constructed instead of being discovered (Crotty, 1998, Blaikie, 2010). Suggests multiplicity of interpretations.	S-best explains theory developed through constructivist grounded theory. W-Constructionism falls short in explaining natural science.
Conventionalism	Theories do not equate to reality except in the minds of scientists (Blaikie, 2010). Associated with idealist ontology.	S: Offers alternative explanations to theories. W: Over-reliance on social setting in interpretations

(Source: Blaikie, 2010)

### 4.1.2 Justification of adopted stance

For the purposes of theory, the different views explained in Table 4.1 seem to be separable, yet the demarcation can blur in practice. For instance, both falsificationism and constructionism reject view of absolutism while there is a clear demarcation on how each arrives at a conclusion, with the latter suggesting that meaning is constructed. Falsificationism is based on experimentation. Resemblances can also be drawn on empiricism and rationalism which ride on inferences regardless of the fact that the inferences can be different. In the current research, constructionism is adopted on the basis that knowledge is generated by the researcher and the learners while utilising WhatsApp. Granted, the results anticipated in the study will be by trial and error, adopting falsification will be unjust as it falls short on demarcation. On the same

note, traces of empiricism can be identified in the study, but constructionism is upheld as the ultimate epistemology because of the multiplicity of interpretations adopted.

Any one of the six epistemological views discussed in Table 4.1 has profound effects in researchers' choices on paradigm, formulation of research questions, methodological and methods adopted. Surprisingly, Crotty (1998) constructed the four-column schema (epistemology; theoretical perspective, methodology and methods) for a research process without introducing ontology and axiology, based on the thinking that epistemological assumption will determine the two assumptions. While it will be accepted that meaning construction and reality cannot be separated, it should not be taken for granted that one leads to another. Section 4.1.3 provides different ontological perspectives.

### **4.1.3 Ontological assumptions**

Ontology is a philosophical parameter which focuses on "nature of reality" (Saunders *et al.*, 2009:110; Creswell, 2007:16). Ontology addresses issues of existence. Epistemology and ontology issues appear inseparable as they occur together. For instance, Crotty (1998) compares realism and objectivism to mean singular meanings to truth independent of consciousness. Saunders *et al.* (2009) recognise two ontological perspectives and these are objectivism and subjectivism.

Objectivism was founded by Ayn Rand (1905-1982). Fundamental to objectivism is the idea that reality exists regardless of what happens to an individual or society. Objectivists believe in absolutism and accept reason as the only valid means by which knowledge is attained. For instance, objective researchers are independent from what is being researched and believe that reality is best characterised by objects which are tangible and measurable (Hussey & Hussey, 1997; Creswell, 2007; Saunders Lewis & Thornhill, 2009). Assuming that societal distortions are kept minimal, it would suffice to accept objectivist perspective without doubt. However, reason is not uniform. Instead, the principles and concepts formed on perceptual basis might vary and deceive one in making conclusions. Nonetheless, objectivism stands as a satisfactory ontological explanation in natural science, but it should be noted that not all inquiries fall within natural science. For the reasons stated, objectivism is not adopted in the current study.

Another type of ontology is subjectivism. Subjective ontology entails that the investigator cannot be detached from the phenomenon under study (Creswell, 2007), but rather chooses to

interact with the participants. Meaning is derived from interaction between objects and subjects. As such the meaning attached by one researcher can differ according to the way in which interaction occurs (personal view) through experience. Subjectivism is characterised by an interpretive philosophy, accepting that truth is found through meaning and often associated with qualitative data collected over a long period. The chances of experiencing first hand truth are enhanced if the researcher spends more time in the research field. (Creswell, 2009).

Subjectivism is assumed in this study because the key focus is to gain a deeper understanding of the instructional time phenomenon, taking into account the participants' reflections on using WhatsApp to solve learning efficiency challenges. Although measures of instructional time loss are done in the study which in essence might have called for objective stance, the main focus is to generate actions to improve NCV problems. While it is acknowledged that middle stance in ontology would have offset the weaknesses of each, objectivity restricts multiplicities of reality in a natural setting, hence adopting subjectivity.

#### **4.1.4 Axiological assumptions**

Axiology deals with values in carrying out a research. (Hussey and Hussey, 1997; Saunders *et al.*, 2009). Values reflect how researchers "position themselves" (Creswell, 2007:18) in the research process. In addition, values reflect decisions made by the researcher, starting with selection of field of study, philosophical assumptions, paradigms, methods and interpretation of results.

In certain instances, one philosophical assumption leads to the other. As such epistemology adopted will reflect ontology and subsequently axiological assumptions (Hussey & Hussey, 1997). For instance, researchers who adopt rationalist epistemology are more likely to adopt objective or shallow realist ontology since they hold the belief that scientific inquiry is value-free. Positivists believe that objects existed before the researchers started to study them and will exist even after the study. However, this notion seems to ignore the fact that social actors can change the objects; as Popper (2002) suggested, truth can only be provisional (Crotty, 1998). On the other hand, empiricists are more likely to adopt idealist ontology since they believe that researchers cannot be separated from the objects being studied. Research is value-laden and researcher influence cannot be ruled out. Values help to explain credibility, confirmability, transferability and dependability for interpretive research.

In the context of the current study, the researcher was actively involved together with the learners in generating actions for the purposes of solving learning problems. Nonetheless, the researcher made sure that bias was avoided without being detached from the study. Even though positivist researchers might claim to be value-free, it is argued in the current study that a researcher cannot be completely separated from the phenomena being researched. There could be intrinsic values at play. In addition, the choice of design, sampling and interpretations involve some kind of values (Given, 2008) although they may not be outstanding.

The researcher's role is crucial because it influences the paradigm and methodology adopted. Blaikie (2010) identifies six roles that a researcher can adopt in research, as outlined in Table 4.2.

**Table 4. 2: Researcher roles**

Possible researcher role	Explanation
Detached observer	Role adopted by researchers who are disengaged from the research in an attempt to achieve objectivity. Stance typical of shallow realist.
Empathetic observer	Although objectivity is maintained, researcher still believes that interaction with social actors strengthens understanding
Faithful reporter	Faithful reporter understands the phenomena through immersion allowing flexibility in the study.
Mediator of languages	Role adopted by researchers who are always attempting to transform participants' current situation.
Reflective partner	Researcher attempts to emancipate participants through research and adopts critical theory as a paradigm of choice.
Dialogic facilitator	Researcher allows many voices to be heard in the research since understanding is crucial which cannot be achieved through monologic conversations

(Source: Blaikie, 2010)

In the current research, the researchers' role alternates between faithful reporter, mediator of languages and dialogic facilitator. However, because of flexibility and immersion, faithful observer appears outstanding.

## **4.2 Research Paradigms**

Research paradigm epitomises the associated philosophical assumptions which a researcher adopts in finding answers and interpreting them in a certain way. Blaikie (1993:106) refers to paradigm as a "design matrix" characterised by epistemology, ontology and exemplars. Guba and Lincoln (2005) add axiology and methodology to the design matrix, but exclude exemplars. Crotty (1998:35) corroborated the view by claiming that "the prevailing paradigm shapes the reality to be studied and legitimates the methodology and methods whereby it can be studied".

Other researchers (Guba, 1990; Creswell, 2007) use terms such as ‘worldviews’. The current study consistently uses the term ‘paradigm’.

The term ‘paradigm’ was coined by Thomas Kuhn (1922-1996) with reference to a set of beliefs which a researcher carries in the background while attempting to solve any scientific inquiry. Kuhn uses the term paradigm in many instances, leading to confusion. Despite the confusion, the study adopts Blaikie’s (1993) meaning as it captures wide aspects of design. The phenomenon under study has to be examined within the confines of the paradigm (Blaikie, 1993). However, blame should not be levelled at a paradigm if problems are not solved (Blaikie, 1993), but instead should trigger more inquiry until the adopted paradigm fails to address the research questions. Kuhn believed in a single paradigm which Imre Lakatos (1922-1974) opposed, instead advocating for pluralism in paradigm. Lakatos advocated for a central position between Popperian devotion to observed validity against Kuhn’s indebtedness to dependability. It is against this background that this study adopts pragmatism as the paradigm of choice (see section 4.2.4). For the purposes of perspective, the various paradigms are highlighted first in the section 4.2.1.

#### **4.2.1           Categorisation of research paradigms**

This study explains the four key paradigms (not exhaustive) suggested by researchers — positivism/postpositivism, constructivism, critical theory (Guba & Lincoln, 1998), interpretivist (Blaikie, 1993), and pragmatism (Creswell, 2007). Some of the paradigms’ assumptions are similar and closer to each other, for example hermeneutics and interpretivism. In fact, Crotty (1998) classifies hermeneutics as a sub-group of interpretivism.

Despite having several paradigms, no paradigm should claim superiority over another because they all operate at paradoxical ends. Nonetheless, it is important to understand the different paradigms because each has implications in the inquiry (Guba & Lincoln, 1998). Due to space limitations in the current study, a critique of each of the four paradigms is given in Appendix 11 and a detailed analysis of the adopted pragmatic paradigm is given in the subsequent section.

#### **4.2.2           Pragmatism**

Pragmatism is a research philosophy which is concerned with answering the research problem. Pragmatism is linked to Charles Sanders Peirce (1839-1914) following Immanuel Kant’s work on instituting laws with practical alignment. Peirce’s emphasis on action and knowing might have emanated from his career as a practising physicist (Maxcy, 2003).

One of the fundamental assumptions of pragmatism is that an inquiry cannot be attributed to one scientific explanation or methodology. Pragmatic researchers regard formalism as limiting to an inquiry (Cherryholmes, 1992; Maxcy, 2003) on the basis that reality keeps changing as the inquiry progresses. Moreover, sticking to formalism restricts flexibility and adaptability to changing events. As such, the ideal way to avoid philosophical and methodological debates during an inquiry is to adopt pragmatism (Johnson & Onwuegbuzie, 2004) which focuses on addressing the research question. Onwuegbuzie and Leech, (2005:377) point out that “researchers who ascribe to epistemological purity disregard the fact that research methodologies are merely tools that are designed to aid our understanding of the world”. Nevertheless, this should not be regarded as a scapegoat to philosophical issues, but considering incompatible differences in plurality and purity (Orlikowski & Baroudi, 1991), pragmatism offers a middle ground (Johnson & Onwuegbuzie, 2004; Goldkuhl, 2012). Researchers (Cherryholmes, 1992; Johnson & Onwuegbuzie, 2004; Goldkuhl, 2004; Creswell, 2007; Venkatesh, Brown & Bala, 2013) indicate use of mixed methods as a preferential way to collect data when adopting pragmatism with qualitative data offsetting the weaknesses of quantitative data. Pragmatism recommends eclecticism for gaining comprehensive findings to an inquiry because of freedom of choice (Johnson & Onwuegbuzie, 2004). Furthermore, action is associated with multiple realities; therefore, formalism may not give a satisfactory explanation to an inquiry.

A key ontological assumption of pragmatism is on the link between action and human knowing. An inquiry is triggered by doubt. Inquiry leads to belief and subsequently habits (Maxcy, 2003; Johnson & Onwuegbuzie, 2004). The process resembles an infinite loop with action responsible for dismantling doubt. Knowledge is shaped by action. Inferences of knowledge are best seen through practical significances (Goldkuhl, 2012). Although similarities can be drawn with critical theorists on critiquing and dedication to transformation, advocates of pragmatism are further more interested in the outcome as generated from the actions (Maxcy, 2003; Greenwood & Levin, 2005). Through action, people can improve their circumstances.

Pragmatism has high regard of truth as what works since reality is not fixed (Maxcy, 2003; Johnson & Onwuegbuzie, 2004). As events change, action changes and subsequently the processes involved. Constructed knowledge is used to manage transformation (Goldkuhl, 2004). This is in contrast to positivistic thinking where truth is fixed and is thought to have

existed prior to being researched. Nonetheless, the purpose of an inquiry is to solve the research question (Teddlie & Tashakkori 2003). Therefore, any action which works to achieve that goal is believed to produce truth. Moreover, the best probable solution for eliminating doubt is through action achieved through practice.

Values take centre stage in pragmatism as researcher is responsible for transformation. The researcher values are responsible for shaping experience of the subjects through action. In an effort to improve outcomes of NCV learners in South Africa, this study adopted the use of pragmatism as a paradigm of choice. As a researcher, carrying out action research for the NCV learners shows interests in generation practical actions to achieve improved learning outcomes. The results at each stage are used in an incremental transformation. The inter-subjectivity nature of inquiry involves dialogue between the investigated and the investigator to be dialectical in order to improve the conditions of the individuals similar to critical theory. Because the researcher's values take centre stage, the language used in the current study reflects these. Congruent with pragmatism is abductive reasoning, as adopted in this study.

#### **4.2.3 Criticism of pragmatism**

One of the major criticisms of pragmatism is its middle position on philosophical debates. It tends to be contended that the worldview is feeble in epistemology and ontological suppositions. The basis is that by adopting a middle stance, the theorists might be dodging essential questions on what knowledge is and issues of reality. However, Maxcy (2003) contends that human experience is not foundational and cannot be categorised. Moreover, action cannot be separated from theory.

Another criticism is based on incremental change (Johnson & Onwuegbuzie, 2004). Incremental change is regarded as problematic in cases where immediate solutions to societal issues are needed. Immediacy to solution brings gratification to individuals. Change through pragmatism is prolonged. As such the paradigm is not best for natural science, for instance in health sector where efficiency and precision is required. Conversely, it should be acknowledged that incremental changes allow the researcher to modify actions accordingly before it is too late. Crotty (1998:63) comments pragmatism as “peaceable and certainly growthful world”. More often, the process has a greater chance of giving the desired outcomes as it is not characterised by power struggles and instant gratification like in critical theory.

Besides the above-mentioned weaknesses, pragmatism has been criticised on issues of workability. Treating truth as what works might be regarded as a template of uncertainty. Unless if researchers clarify the meaning of workability, this can be ambiguous when it comes to practice (Johnson & Onwuegbuzie, 2004). The flaw on workability is assumed as “radical relativism in which anything goes” (Maxcy, 2003:62). Maxcy (2003) further criticises pragmatists on their lack of principles or standards. However, if it is assumed that an absolute world does not exist, then knowledge can be situated between chaos and order, hence truth keeps changing.

#### **4.2.4 Justification for pragmatism adoption**

In Appendix 11, an explanation of paradigms has been presented. It is important for a researcher to know the different paradigms in order to make well informed decisions during the inquiry. Selection of paradigm has methodological and practical implications in the research (Guba & Lincoln, 1998). However, selected choice should not be regarded with a superiority perspective; instead, addressing the problem under inquiry should be prioritised. This study is well positioned within a pragmatic paradigm to allow flexibility in answering research question without putting a lot of concern on philosophical assumptions. The purpose of the current research is to generate actions which can be applied to deal with issues affecting NCV learners. While it is well acknowledged that philosophical assumptions guide researchers in developing and supporting their arguments, but, it should not stand in the way of solving problem. Notably, other paradigms are effective, but not in this study, where the inquiry is outcome oriented. Responding to the issues of “radical realism and radical relativism” (Maxcy, 2003), this study stands guided by research question — How can instructional time be extended using Mobile Social Networks(MSN) to enhance learning efficiency of Technical Vocational Education and Training learners? Research questions which are practical in nature demand implementing practical research strategies as discussed in subsequent section.

### **4.3 Research strategies**

Foundational choices of research strategies must be situated within a paradigm or worldview. Bryman (2008) uses the term ‘research design’ to refer to what other researchers (Saunders *et al.*, 2009; Hussey & Hussey (1997) refer to as research strategies. This study adopts the term research strategy to refer to how the researcher plans to do the investigation for the motivations behind addressing the research question (Saunders *et al.*, 2009). The present study uses the term research choice referring to what Bryman (2008) referred to as the research study. Saunders *et*

*al.*, (2009:138) identify different strategies as “experiment, survey case study action research ethnography archival research”.

Research strategies are often associated with specific approaches or paradigm (Hussey & Hussey, 1997). There exist cases when strategies are implemented using either of paradigm based on researchers’ assumptions (Hussey & Hussey, 1997). It is not surprising that strategies which are classified as positivistic may be implemented in interpretive research. Researchers who put emphasis on answering research question are more likely to adopt pragmatism and action research as in the case of the current study.

#### **4.3.1 Action Research**

This study adopts action research as a strategy of choice because it is applicable in inquiries where generation of actions is a priority. In addition, researchers (Johnson & Onwuegbuzie, 2004; Greenwood & Levin 2005; Onwuegbuzie & Leech, 2005; Goldkuhl, 2004, 2012) have shown the use of action research in studies adopting pragmatism. Moreover, the use of action research in information systems (Baskerville & Wood-Harper, 1996, 1998; Baskerville & Myers, 2004) and education (Kemmis & McTaggart, 2005) is well documented.

The concept of action research (AR) was coined by Kurt Lewin around 1947 (Baskerville & Myers, 2004). Action research is “an approach commonly used for improving conditions and practices” (Koshy, Koshy & Waterman, 2011:1). AR involves action, involvement of practitioners, collaboration between researchers and practitioners (Saunders *et al.*, 2009), evaluation, and critical reflection in an iterative direction. Research is jointly controlled by practitioner and researchers for the betterment of the inquiry and organisation. The role of the researcher is twofold: adding value to the body of knowledge and assisting the subjects through practical solutions applied. For the changes to take place, people in the research must be active subjects rather than passive. Fundamental to AR is cooperation and teamwork between the researcher and subjects within a studied social setting (Baskerville & Myers, 2004). In the case of the current study, the researcher was assisted by subject experts who double as NCV programming lecturers. The researcher’s interest, on the other hand, was to add knowledge to theory of using Mobile Social Networks in solving learning efficiency challenges through extending instructional time.

Philosophical assumptions on AR are not well institutionalised, and along the process some scientist will question results based on “fundamental aspects” (Baskerville & Wood-Harper, 1998:236). However, it seems weak to criticise AR on the basis of philosophical assumptions since the paradigm has origins in empiricism (Johnson & Onwuegbuzie, 2004). In any case, the key focus is on generating actions and outcome which helps the community being investigated. Action research is cyclic in nature (Baskerville, 1999; Kemmis & McTaggart, 2005; Tharenou, Donohue & Cooper, 2007) with each phase involving origination of the process, identifying actions and assessing the results which can then be taken into the next phase. Within action research, Kemmis and McTaggart (2005) identified seven forms of action research and these are explained in Table 4.3.

**Table 4. 3: Types of Action research**

<b>Type of Action research</b>	<b>Explanation</b>
Participatory Action Research	Characterised by ownership of research between researcher and practitioner for transformation.
Critical Action Research	Seen as resulting for dissatisfaction. Uses language for communicative action and self-reflection.
Classroom Action Research	Used by lecturers for the purposes of improving their methods of teaching
Action Science	Often implemented by consultants in organisations (Hussey & Hussey, 1997).
Soft Systems Approach	The practitioner generates models to interrogate current systems and implement changes.
Industrial Action Research	Emphasis is on collaboration and reflection on organisational democracy.
Action Learning	People learn from each other’s experiences to achieve efficiency

(Source: Kemmis & McTaggart, 2005)

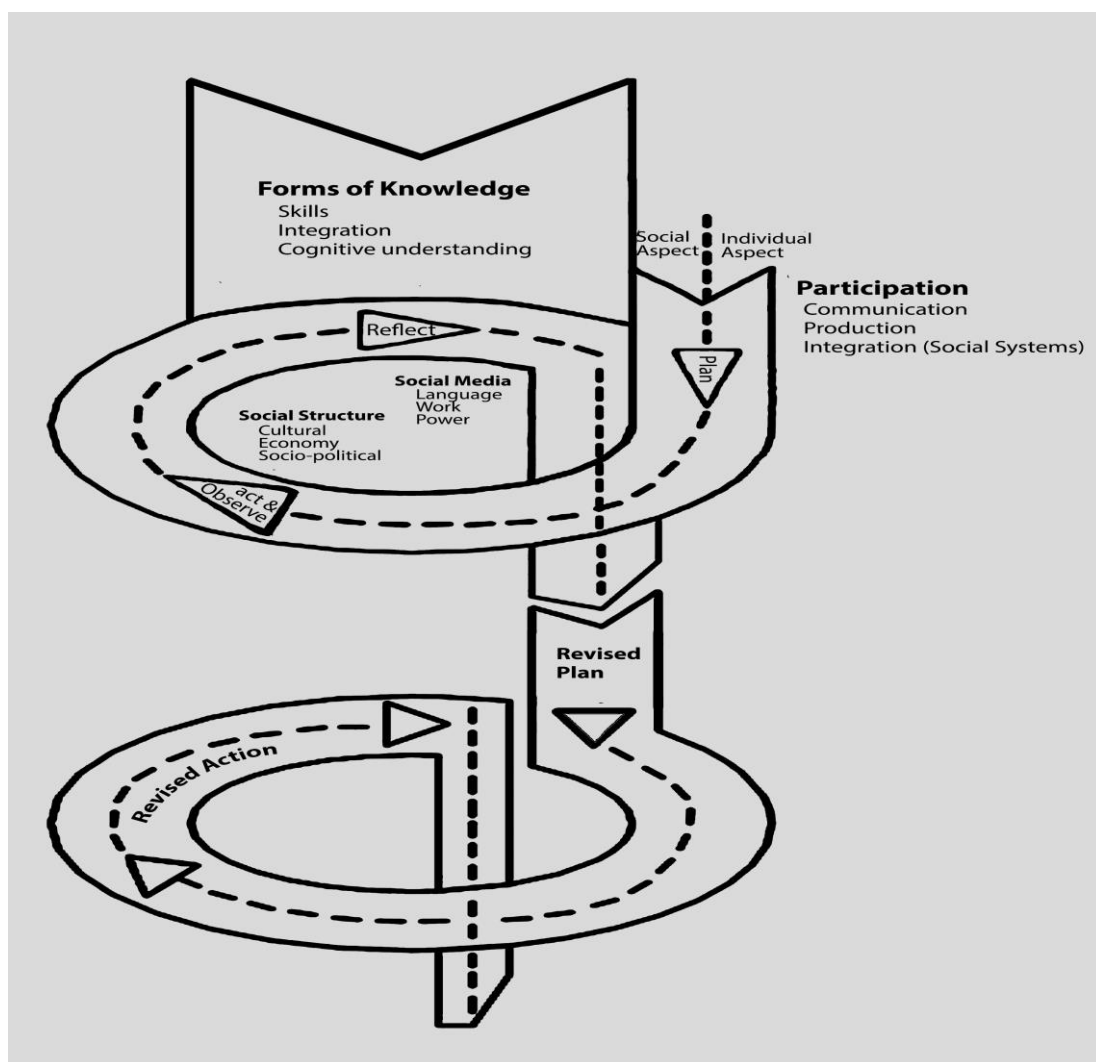
Motivated by the “shared ownership of research projects” (Kemmis & McTaggart, 2005:560), the current study adopts Participatory Action Research (PAR). It is argued in this study that through shared ownership, both the inquiry and the organisation are set to benefit as the researcher and lecturers have a shared objective, for instance improving instructional time and learner efficiency within the TVET sector in South Africa as in the current context and other similar learning environments. The next section describes some characteristics of PAR.

#### **4.3.2 Characteristics of PAR**

PAR is social and educational in nature. Collaboration among group of learners using MSN occurs in a social setting. Socialisation and individuals cannot be separated (Kemmis & McTaggart, 2005). Participants learn from each other through sharing experiences. Moreover, through participation on WhatsApp learners are able to examine their knowledge against the rest of group members. Although it has been noted that free-riders, ‘hitchhikers’ /‘social loafers’ (Kerr & Bruun, 1983; Kreijns *et al.* 2003) may exist; with the help of lecturers and others peers,

it is expected that the muted voices will be lessened. Moreover, language barriers are removed when group members chat on social networks as group admins allow flexibility without compromising on clarity for the participants. Issues of grammar, tense are not crucial on group chats. Removal of language barriers emancipates learners from college policies such as medium of instruction, for instance English in the case of most South African institutions of learning.

PAR is spiral in nature with key stages involving planning, actions and observation and reflection. Figure 4.2 reflects the four main stages of participatory action research together with the characteristic on the individual side and the social aspect of the research process.



**Figure 4. 2: Participatory Action Research**  
(Source: Adapted from Kemmis & McTaggart, 2005)

Within the iterations are recursive relationships (Kemmis & McTaggart, 2005) of social negotiation between the individual and the social aspect. In the case of the current study, as depicted in Figure 4.2, recursive relationships are among the individual (Computer

Programming work), knowledge of NCV learners, social structures shaping Computer Programming environment and WhatsApp media used collaboration. The individual - in this case, the learner - is likely to gain skills such as communication and social integration through participation. On the social side, factors like language, work and power develop and in turn characterise the individual communication, production and integration; these in turn affect the social structures.

### **4.3.3 Weaknesses of PAR**

While considerable strength to PAR is noted, it should be acknowledged that the strategy has its downfalls. Researcher may monopolise the actions and direction of inquiry. Although researchers remain guided by the research question, pursuing personal interests like publications and gaining recognition from authorities with a promotional view might be another angle. Ozanne and Saatcioglu (2008:434) cited “politics of power” as one weakness of PAR. Neutrality in politics or economy at governmental or organisational level is not guaranteed for the researchers or practitioners (Kemmis & McTaggart, 2005; Ozanne & Saatcioglu, 2008). However, since PAR is characterised by shared control of ownership between researchers and practitioners, direction of inquiry is mutually arrived at inter-subjectively. While acknowledging the above, the participants will be given freedom to exit from the research anytime if they wish to do so as stated in the consent forms (see Appendix 4).

Another notable weakness of PAR is the assumption of a uniform community (Ozanne & Saatcioglu, 2008). Communities are never uniform as issues of gender history imbalances may affect participation. This study attempted to be gender-neutral in all communication with respect of each other being the main emphasis. In addition, the learners who are participants had been working together since joining colleges and as such gender issues must have been resolved in their third year at the college. Nonetheless, the researcher remained on the look-out for such cases throughout the study. Moving to section 4.4, a discussion on research choice is given.

## **4.4 Research Choice**

The present section presents a discussion on data collection and data analysis techniques used in the investigation. The term research choice was adopted since it gives a clear indication of researcher’s preferences in data collection and analysis techniques. Although other researchers (Teddlie & Tashakkori, 2003) used the term ‘research design’ to mean the same, it is argued in

this study that the term is not indicative of an encompassing process involved in selecting data collection techniques with corresponding analysis methods. The present study uses multiple methods where qualitative data and quantitative data is mixed for the purpose of minimising weaknesses of each method.

‘Multiple method’ is a term where there is more than one data collection and analysis technique is applied in the research process (Saunders *et al.*, 2009). Multiple method was put forward by (Teddlie & Tashakkori, 2003) as a third methodological perspective in response to two key challenges of qualitative and quantitative movements. One of the greatest attacks on mono-method has been necessitated by the paradigm issues. Inherently, quantitative methods have been associated with positivistic paradigm while on the other hand qualitative methods are associated with interpretive paradigms. The principle holds truth in instances where value of truth is fixed and metaphysical disputes are non-existent; however, classical pragmatists such as Pierce, James and others opposed the idea. Just as Popper (2002) suggested, truth is provisional (Crotty, 1998) and its value is governed by experiences and practical actions (Johnson & Onwuegbuzie, 2004) which are not constant and may require methodological dualism contrary to what purists suggests.

In addition to paradigm wars, incompatibility thesis (Johnson & Onwuegbuzie, 2004) also gave rise to multiple methods. Purists who uphold qualitative or quantitative views argued against the possibility of incorporating qualitative data collection and analysis techniques because of their differences in paradigm assumptions. As such, pragmatism offered peace to paradigm concern by rejecting incompatibility thesis. Instead, pragmatism as a paradigm is outcome-oriented and puts more emphasis on addressing the research question (Teddlie & Tashakkori, 2003; Johnson & Onwuegbuzie, 2004). These contentions gave rise to two kinds of multi method strategies: mixed methods and mixed model research (Teddlie & Tashakkori, 2003).

This study adopts mixed method as the research choice owing to a number of factors. First, as indicated in section 1.3, the objective of the research is to generate practical actions in order to deal with learning efficiency issues experienced within the NCV programs. Leech and Onwuegbuzie, (2010) identify five instance objectives which can be used in linking research choice and these are: exploration, description, explanation, prediction and influence. The objective of this study shares traits of influence and prediction since there is manipulation of instructional time for learning efficiency purposes (influence). Extending instructional time is

expected to increase contact time with hope of improving skills, knowledge and competence (prediction objective). Mixed method is seen as a research choice which can deal with collecting and analysing qualitative and quantitative data. Related issues of paradigm are best dealt with through adopting pragmatism. Moreover, researchers (Bazeley, 2002; Teddlie & Tashakkori, 2003) cited independence of methods from paradigms. Even though paradigm foundations for mixed methods will remain problematic, adopting pragmatism avoids metaphysical issues such as truth and reality. In the case of the current study, all actions are geared towards answering the research question and the associated sub questions as highlighted in section 1.3. The intention of using WhatsApp was to extend instructional time. Participation of learners on the WhatsApp group meant extension of contact outside tabled teaching time. Online questionnaire comprising open-ended and closed questions was used to collect qualitative and quantitative data. Results from test scores were combined with the collected data to determine expected changes in learning efficiency.

Second, adopting mixed methods in collecting data has the advantages of producing stronger inferences (Saunders *et al.*, 2009; Teddlie & Tashakkori, 2003; Johnson & Onwuegbuzie, 2004). Weaknesses of qualitative data was offset by strength of quantitative data. Moreover, adopting a pluralistic stance has advantages of complementarity resulting in deeper understanding and generalisation of findings (Bazeley, 2002) which cannot be achieved through the mono method. This is termed significance enhancement (Leech & Onwuegbuzie, 2010). In addition, results are mutually corroborated when dualism of choices is adopted. Nonetheless, adopting mixed method research in the present study must not be regarded as an attempt to prove superiority of choice over mono method. As noted by Johnson and Onwuegbuzie (2004), using method or assumptions that best tries to find a workable solution through mixing qualitative and quantitative technique must be of priority during research process. Mixing quantitative and qualitative data adds breath to the research as findings of one may allow for expansion in results. Although researchers voiced the a-paradigmatic assumption (Bazeley (2002; Teddlie & Tashakkori, 2003; Johnson & Onwuegbuzie, 2004) when adopting mixed methods due caution must have considered on assumptions else findings will be subjected to criticism (Teddlie & Tashakkori, 2003). Despite the noted advantages, mixed methods must be competently designed to get the best of mixing techniques (Bryman, 2008), otherwise the results will not be reliable.

Third, mixed methods adoption allows exposition of variety of divergent views when different techniques are adopted (Saunders *et al.*, 2009; Bazeley, 2002; Bryman, 2008). Qualitative data and quantitative data express different views. Some of the challenges associated with mixed methods includes spreading of resources evenly and time management. In the context of the current study, enough time for data collection was planned for, with each of the data techniques given equal status following the timelines. WhatsApp discussions were held outside class time to avoid class disruption.

Likewise, mixed methods possess a multi-disciplinary perspective with evidence of its use in information systems, education, health and other sectors. However, issues in mixed methods will persist in researches, with some problems already identified. Teddlie and Tashakkori (2003) draw attention to associated nomenclature, purpose/rationale, paradigmatic issues, design and inference issues. In response, Leech and Onwuegbuzie, (2010) suggested different rationale for adopting mixed methods; these are discussed in Table 4.4.

**Table 4. 4: Rationale for Mixed Methods**

<b>Rationale</b>	<b>Explanation</b>
Participant enrichment	Occurs when mixed method is adopted with the rational of heightening sample
Instrument Fidelity	Emphasis is on suitability of research instruments
Treatment integrity	Mixed methods adopted with focus on reliability of the interventions
Significance enhancement	Implemented for exploiting the best from the methods for the purposes of transferability of findings

(Source: Adapted from Leech & Onwuegbuzie, 2010)

Treatment integrity and significance enhancement possess overlapping strength and is the reason behind adoption of mixed methods in this study. It is essential to know what is being mixed and the point of mixing in order to reduce design issues associated with mixed methods. When using mixed methods, it is important to know what is being mixed and the point of mixing in order to reduce design issues associated with mixed methods. Leech & Onwuegbuzie, 2010:64 identified three key factors affecting mixing strategies and these include “...(a) level of mixing, (b) time orientation, and (c) emphasis of approaches”. The current study adopted concurrent data collection as both observations of documents, interviews, questionnaires and test scores was done simultaneously. The purpose of adopting concurrent procedure was to maximise on time, as implementation of the intervention using WhatsApp had no effect on data collection on instructional time loss during college time. Intervention was applied outside teaching hours. Both qualitative and quantitative procedures were treated equally for complementarity purposes.

As much as typologies are important for clarification purposes and giving an indication to the researchers on how to proceed with the research process, they are not exhaustive of the research process (Teddlie & Tashakkori, 2003). In fact, it is argued that as the context change, typology can change as well. Other studies have suggested an interactive model which encompasses: purpose, conceptual framework, methods and validity with research question filling the central part or the heart of the research. The present study adopted concurrent mixed methods research where qualitative data and quantitative data had equal status. Integration of results was done for greater understanding and generalisation of inferences. The logic of inference adopted in the present study was abduction, as described in section 3.2. Elements of interactive model (Maxwell & Loomis, 2003) are the foundational basis in the concurrent mixed model adopted for this study.

#### **4.4.1 Adopted Research Procedure**

As discussed in section 4.4, the current study adopts concurrent mixed method (Creswell, 2009) together with aspects of interactive model underlying the development of the instrument. The research is carried out in three phases. Figure 4.3 highlights the concurrent mixed method research model adopted in the current study with different data collected at each of the three phases.

In the current study, quantitative data which comprised of class registers, timetables and record of marks was mixed with qualitative data (lecturer and learner interviews and learner questionnaire) as reflected in Figure 4.3. It is suggested that combining the two helped to offset the weaknesses of individual typologies.

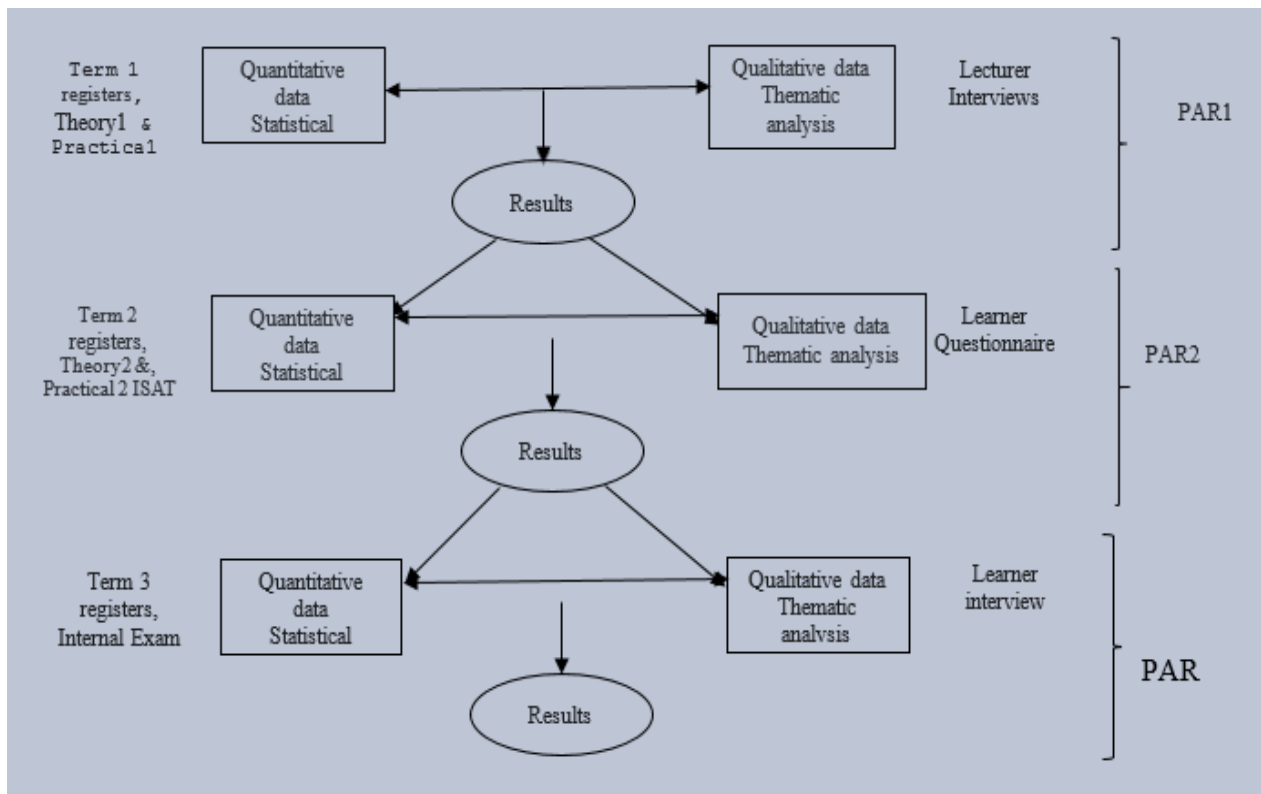


Figure 4. 3: Concurrent Embedded Mixed Method for the study

#### 4.4.2 Anticipated Methodological issues

Despite adopting concurrent mixed methods, it is anticipated that challenges will be encountered in the process of integrating quantitative and qualitative data. Integrating numbers and codes can be a challenge as the two types of data are positioned in opposing ends. The situation can be compounded by overlapping meanings during analysis. In the current study, the researcher remained guided by the research question during data analysis.

#### 4.5 Data collection technique adopted

Data collection assists researchers to make informed inferences using primary or secondary data from the empirical setting. The data collected at the current site where a phenomenon of interest is observed is regarded as primary data. Johnson and Turner (2003) identify five techniques of collecting primary data as questionnaires, interviews, focus groups, tests and observation. Hussey & Hussey (1997) refers to the existing data such as published statistics, reports and organisational records as secondary data. The study adopted inter-method mixing by using questionnaire, interview, participant observation, documents (registers and test scores) in the collection of primary data for the purposes of corroboration and overcoming weaknesses of another instrument and corroboration. The instruments used are discussed in section 4.5.1 to section 4.5.3.

### **4.5.1 Questionnaire**

The questionnaire comprised closed questions and open-ended questions for purposes of depth and breadth of data collected. The closed-ended questions used a 5-point Likert scale (Strongly Agree=1 Agree=2, Not Sure=3, Disagree= 4 and Strongly Disagree=5). The questionnaire was selected for data collection owing to the associated cheaper cost in distribution, especially in situations where the subjects' location is geographically spaced. In the context of the current study the participants were provided with a web link s to complete the questionnaire online.

In the current study the researcher adopted Tharenou *et al.*'s (2007) Topic Applicability and Perspective (TAP) technique during construction for the purposes of ensuring valid and trustworthy responses. Looking at the first aspect of Topic, the researcher focused only on questions that had a relation with instructional time, Mobile Social Networks and learning efficiency.

The second aspect of Applicability was applied in questionnaire design in order to make sure that only questions related to the subject matter and relevant to the NCV IT learners were asked. Factual questions, like exact number of instructional time loss, were avoided. Instead the researcher asked for a rough estimate. Although the information might not be exact, it is sufficient to highlight instructional time loss during classes.

The last aspect of Perspective guided the design of questionnaire by making sure that the instrument was clearer to the participants. This was achieved through using simple English to reduce complexities associated with language. Questions were grouped according to the related research sub- questions.

Admittedly, questionnaire return rate can be low and reliability of responses rests on clarity of the instrument and participants' writing and reading skills (Leedy & Ormrod, 2010). However, in the context of the present study, the researcher requested time from subject lecturers to have learners complete the questionnaire.

### **4.5.2 Participant observation**

Participant observation allows the researcher to take part in the research and 'feel' the situation in which participants are working. Participant observation serves as a powerful technique as the

researcher gains insight into the behavioural changes of the participants (Bryman, 2008). Gold (1958) identifies four types of observation as:

- ***complete-participant***, where researchers get involved in the research without the other participants' knowledge that they are being investigated from within,
- ***participant-as-observer***, where researcher informs the participants that he/she is investigating them from within,
- ***observer-as-participant*** — researcher informs the participant and spends less time in the group, and
- ***complete-observer*** — researcher observes from outside the inquiry environment.

The researcher adopted the participant observer role where he, in fact, had two roles: subject expert and as a researcher for Computer Programming. Apart from collecting data, he decided to spend more time with the participants, as suggested in Gold (1958), as interventions were actioned. Being familiar with the challenges that NCV learners experience and their curriculum, the researcher interacted with learners with confidence. Interacting with learners on regular basis helped to remove technical challenges that they experienced when working on their own. Although some ethical issues may arise when one adopts such techniques, thorough reasoning was applied to deal with deception in the current study. Apart from participant observation, interviewing participants discussed in section 4.5.3 is another technique of data gathering adopted in this study.

### **4.5.3 Interviews**

The study adopted semi-structured interview questions to allow lecturers and learners to give further explanation to probed questions for clarity purpose (Johnson & Turner, 2003). Despite criticism by Glaser (2007:95) that adopting an interview guide “forces and feeds interviewee responses” posing bias in responses, Bryman (2008) suggests that interviews allow the respondent chance and freedom to react with elbowroom. The researcher, however, would still contend that Glaser's criticism may have been directed to constructivist-grounded theorists with different philosophical assumptions on which the classical and constructivist grounded theory operated.

Unlike with a questionnaire, rate of return for interviews is high, although setting up the interview can be difficult due to interviewees' busy schedules. In the current context, interview dates were communicated in advance before each visit. The campus managers informed lecturers of the researcher's visit. Concerning cost, the mentor assisted in covering the travelling to one of the furthest research sites (SC College).

Another weakness of interviews is that they are dependent on how the investigator presents himself/herself. As a trained lecturer, planning is a skill taught during studies; perhaps this eased the planning and presentation during visits to colleges where data was collected. The interview questions were presented to the ethical committee three months before getting into the field and in turn to the colleges before planned visits.

#### **4.5.3 Document analysis**

Documents can be used in qualitative analysis (Bryman, 2008) and also in quantitative studies (Tharenou *et al.*, 2007). It is imperative for the researcher to make sure that the documents collected are authentic, credible, clear and comprehensive (Bryman, 2008) as they have to be constantly referred to. In the context of the current study, documents such as student attendance registers, assessment marks and timetables were used for the purposes of validating instructional time discourse. These were collected from the subject lecturers and kept under lock and key. Most of the records were extracted from the official college management system (ITS).

As part of the ICASS, participants complete a practical project called Integrated Subject Assessment Task (ISAT) and an internal exam administered to all learners studying Computer Programming level 4 at the end of Phase 2 in September. The current study made use of Theory test 1, Theory test 2, Practical tests 1 & 2, Internal examination and ISAT. All the theory tests and practical tests used in the study were the same. The assessments go through moderation process before they are accepted by the focus group for IT in the Western Cape. Marking guidelines are provided to all subject lecturers and assessors are able submit the student marks for capturing after moderation process. Timetables were the other documents used in the study; these were extracted from ITS systems used by all TVET colleges. As such, the researcher believes that documents used are authentic, credible and comprehensive. The next section deals with one of the objectives of the study, which is developing propositions.

#### **4.6 Theoretical Propositions**

The current section provides a set of emerging propositions drawn from the conceptual framework. Given that part of theorising can result in "... concepts, propositions, frameworks, theories, models, meta-models and methods" (Alter, 2016:672), a key goal of this investigation was to deliver one of such artefacts. The researcher postulated five propositions (see Table 4.5) based on literature reviewed in Chapter Two and observations. These were refined from the

data and integrated on the MSN framework while avoiding “the temptation to revert to ideal types” (Avison & Malaurent, 2014:328) in an attempt to avoid neglecting reality from the empirical setting. Nevertheless, the criteria advocated by researchers (Popper, 2002; Whetten, 1989 Lee, 1991) were not ignored, as reflected later in Chapter Six, section 6.2. Proposition development adopted in the current study is consistent with those of Sarker and Lee (2003), where premises determine outcomes. One of the common structures follows the pattern:

***If A happens then B***

The above statement implies that A is a necessary condition for B. If A does not happen, then B will not happen. If for any reason B happens, then the proposition is falsified. The structure is similar to that of deductive argument well-structured for proposition 1, 2 and 5 (P1, P2 and P5 as shown in Table 4.5). Proposition 3 and 4 is consistent with those listed in Johnson-Laird (2002), structured as:

***If A happens then possibly B***

The above proposition allows for possibilities and referred to as “tautological interpretation” (Johnson-Laird & Byrne, 2002:650). Propositions generated this way allow rules of logic to be applied to them for testing purposes (Lee, 1991). Table 4.5 shows a list of propositions envisioned from the concepts identified during preliminary MSN framework in section 3.8.1. Development of propositions in Table 4.5 was consistent with Popper’s (2002) four criteria of proposition i) logically consistent, ii) empirically testable, iii) able to survive attempts to falsify it and iv) explanatory or predict. The current study’s theoretical elaboration is social in nature and stated as propositions which in harmony with Lee (2004), who stated that propositions can be formed without stating any variables as long as they meet the four conditions suggested by Popper (2002). Propositions were tested deductively in the dataset as explained in Chapter Six.

**Table 4. 5: Proposition development**

<b>Number</b>	<b>Proposition</b>	<b>Concept</b>
P1	<i>If awareness of instructional time is positive then lecturers and learners are more likely to engage MSN platforms for extending learning beyond the classrooms</i>	Awareness of instructional time
P2	<i>If there is strong lecturer and strong learner presence then MSN usage for extending instructional time can be successful</i>	Learner-Lecturer Aspect
P3	<i>When there is a perceived match between lecturer contact style and student contact style, participation on MSN platform is more likely to be high.</i>	Negotiated Contact style
P4	<i>MSN usage for extending instructional time can be successful only if there is a guiding framework for the lecturers extending learning beyond the classrooms.</i>	MSN Affordances Integrated MSN Framework
P5	<i>When awareness of instructional time among learners and lecturers is high and institutional support within and beyond colleges is high, learning efficiency will be high.</i>	Learning Efficiency

## **4.7 Applying Participatory Action Research**

An influence and prediction design was used to discover the variables constituting learning efficiency and proposing action to extend instructional time beyond teaching and learning timetable. Arising propositions were checked against the responses from the lecturers and learners together with the test scores. As mentioned in the literature review section, instructional time loss measures are very difficult owing to the level at which the problem occurs, for example individual, class or college level. Ultimately, by the end of the learning cycle, chances are that learners will not have experienced the same instructional time. Practical interventions such as using MSN and reviewing the process iterative have a potential of making a difference. In the current study three PAR phases (see Figure 4.3) of plan, act, observe and reflect, were followed with each stage executed as explained in section 4.7.1.

### **4.7.1 Plan**

Data was collected from five TVET colleges offering NCV IT Level 4 in the year 2018 in the Western Cape Province. Of the four colleges, two (BC and SC) are categorised as rural, while the other two (FB [FB1 & FB2] and CC) are categorised as urban TVET colleges by the South African Department of Higher Education. The two colleges in the rural category had the least enrolment for the NCV level 4 with 10 and 12 full-time learners respectively for SC and BC in the year 2018. FB has two campuses offering the NCV IT programme and in the study, they were treated as two colleges, namely FB1 and FB2. Most learners studying at FB2 are from the predominantly low-income areas.

The initial stages included analysing documents (registers, timetables and record of marks for term 1 and term 2). All learners who accepted to take part in the study were included in the WhatsApp groups set up at each institution to assist the NCV IT Level 4 learners. Theory 1 and practical test 1 scores were used as a yardstick since there had been no intervention as yet. Timetables were used in comparing allocated subject time differences among colleges. Registers were used to check the trends of absenteeism by learners and lecturers. The WhatsApp group was solely for discussing Computer Programming. The researcher was part of each group and acted as a moderator of the discussion. Lecturers were invited to join the WhatsApp group for their respective classes.

### **4.7.2 Act and Observe**

WhatsApp group administration was assigned to the researcher and participating lecturer during each of the three phases. Quiz questions and programming snippets were posted regularly.

Using the information collected in the planning stage, in liaison with the subject lecturer and learners, topics which needed more attention were discussed. Learners were encouraged to post any time of the day after classes as stipulated in the WhatsApp rules signed by participants at the beginning of the study (see Appendix 4). Once per week, one key concept was to be discussed to assist learners to approach ISAT. A one-hour revision was done in preparation for the internal examination. Test scores for the ISAT were analysed in Phase 3. Theory tests 1 and 2 and internal examination test scores were used for judging knowledge. Practicals 1 and 2 and ISAT were used for judging skill. Final passes for the course were used to report on competence, although the scores were not discussed in detail since part of the final mark also consists of 65% of the year mark, and these would already have been analysed in Phase 1 and 2.

#### **4.7.3 Reflect**

Before getting to the next phase, an analysis of the results was done for the purposes of adjusting the mediation in line with the research question. It was anticipated that results would reflect improvements in learning efficiency after the intervention. Reflections from Phase 1 results were fed into Phase 2 and those of Phase 2 were to be fed into Phase 3 for adjusting interventions.

#### **4.8 Sampling**

Sampling deals with the selection of study subjects and groups in order to maximise the chances of answering the research question. While it is impossible to collect data from a full population where the phenomena under study is being experienced, selecting a sample allows researchers to be able to generalise the findings (Tharenou *et al.*, 2007; Hussey and Hussey, 1997). For instance, in the context of the current study, data was collected only from colleges in the Western Cape due to accessibility. However, the selection consisted of rural and urban colleges, which is typical of the South African context. In addition, all colleges offering NCV IT were included with no bias used in selecting participants at each college. As such, the sample was credible as participants were given equal chances of selection (Hussey & Hussey, 1997).

Tharenou *et al.* (2007) identify two main categories of sampling: probability and non-probability sampling. Non-probability sampling is also referred to as 'purposive sampling' (Kemper, Stringfield & Teddlie, 2003). Probability sampling accords a non-zero selection status (Kemper *et al.*, 2003; Tharenou *et al.*, 2007; Leedy & Ormrod, 2010). All participants

have equal chances of being chosen. Examples of probability sampling include stratified sampling, systematic sampling and random sampling.

In non-probability sampling, the chances of being selected are not known. Generalisability from non-probabilistic samples is not based on statistics. As noted in Kemper *et al.* (2003), complex research questions similar to the ones adopted in mixed methods can include both types of sampling since one particular sampling method might present some challenges in exploring the phenomenon under study. It is important to know the sampling frame and the correct population from which a sample should be drawn. Purposeful sampling was applied in this study because of accessibility and the selected participants were the ones identified to possess specific characteristics fulfilling the study. Morse (2007) highlights similar conditions where purposeful sampling can be used, and they match the context of the present study. In addition, the chosen sample is a true representative of the NCV level 4 studying Computer Programming.

#### **4.9 Quantitative analysis**

Documents like attendance registers, test score and lecturer timetables were analysed using descriptive and inferential statistics. The purpose of quantitative data was to confirm the existence of instructional time loss both at individual and class level. In addition, test scores were meant to give a reflection on differences prior to and after intervention of MSN. A statistical application SPSS was used. Quantitative data aided in triangulation of data obtained through qualitative data.

#### **4.10 Qualitative Analysis**

The purpose of qualitative analysis is to find meaning embedded in raw data by accepting multiple realities. As opposed to quantitative analysis where value is through measurement, qualitative analysis occurs through interpretations of meaning in which value is expressed through quality (Dey, 1993). Some fundamental principles associated with qualitative approaches include reflexivity, iterative, thick descriptions and collection of data in a natural location. (Braun & Clarke, 2006; Creswell, 2009; Gibson & Brown, 2009). There are several qualitative methods, and finding a common ground for analytical techniques and procedure is a challenge (Braun & Clarke, 2006; Bryman, 2008). Some of the qualitative processes used in analysing data include discourse analysis, thematic analysis, grounded theory, narrative analysis, ethnographic analysis (Gibson & Brown, 2009), and many others.

The present study uses thematic analysis because of the depth it offers to researchers in producing an expansive interpretation of the concept being studied (Boyatzis, 1998; Braun & Clarke, 2006; Smith & Firth, 2011). Despite the criticism of lack of breadth, thematic analysis provides a clear communication path for readers and researchers from diverse methodologies (Boyatzis, 1998). Section 4.10.1 provides a background on thematic analysis.

#### **4.10.1 Background to Thematic analysis**

Origins of thematic analysis can be traced back to the reincarnation of qualitative analysis in the 1920s and 1930s (Denzin & Lincoln, 1998). Braun and Clarke (2006) consider thematic analysis as the foundational technique for qualitative data on to which other forms of analysis can be developed. Despite sharing overlapping similarities with other qualitative procedures like grounded theory, which operate from specific theoretical and philosophical assumptions (Corbin & Strauss, 2008; Strauss & Corbin, 1990; Hernandez, 2008; Kenny & Fourie, 2015), thematic analysis does not go beyond themes and can be conducted in constructionist (adopted in the current context), realist or essentialist epistemologies (Braun & Clarke, 2006; Vaismoradi, Turunen & Bondas, 2013). Thematic analysis and grounded theory possess a number of similarities like coding, constant comparison of codes, flexibility (Reichertz, 2010). Thematic analysis is also closer to content analysis (Vaismoradi *et al.*, 2013). As identified by researchers' such as Braun and Clarke (2006), Bryman (2008) and Vaismoradi *et al.* (2013), the issue of boundary in qualitative methods is more apparent.

#### **4.10.2 Defining thematic analysis**

Thematic analysis involves identifying codes, categories and themes from the qualitative data collected. Braun and Clarke (2006:79) define thematic analysis as “a method for identifying, analysing and reporting patterns (themes) within data”. Boyatzis (1998) recognise three phases in thematic analysis as seeing, coding and interpretation. An understanding of phenomena starts with observation, followed by encoding the observation, and lastly, interpretation of the observed phenomena (Boyatzis, 1998). Interpretation could be linked to experience of literature (theoretical sensitivity) or the capability to see what is important in all data. Thematic analysis is best applied in studies where research question is open-ended (Braun & Clarke, 2006). For instance, in the present study thematic analysis is well-suited to the open-ended main research question – *How can ...?*

Braun and Clarke (2006) identify ontology and epistemology as the two philosophical types of research questions which thematic analysis attempt to answer. The ontological aspect seeks to capture realities of participants, while epistemological aspect allows researchers to understand the phenomena under study. As a participant observer, the researcher's values are evident and it would be naïve to assume total absence of theories. However, the values were not used not to the extent of polluting data or forcing concepts. Thematic analysis strength lies in openness and flexibility (Strauss & Corbin, 1990; Boyatzis, 1998; Braun & Clarke, 2006) which allow researchers to change techniques as and when required. Although such flexibility may result in inconsistencies, Vaismoradi *et al.* (2013) argue that quality of the study is best assessed by the target recipients when they assess the decisions taken by the researcher. Furthermore, thematic analysis can be viewed as a link between researchers of different orientations because it does not have specific philosophical orientations. However, this should not be misconstrued as being atheoretical (Braun & Clarke, 2006). Braun and Clarke (2016:740) argue that “claimed theoretical independence of TA scholars is often limited by unacknowledged theoretical assumptions”. Moreover, it can be argued that theories, methods and procedures should not inhibit the process of finding commonalities, differences and relationships which are the three keys aims of thematic analysis (Gibson & Brown, 2009) in data.

Some of the key competencies of researchers adopting thematic analysis include theoretical sensitivity and skills to convey the findings which can be regarded as understandable by the consumers of the study (Boyatzis, 1998; Strauss & Corbin, 1990). In the current study, results of each phase were communicated to the participants during each visit making use of field notes collected in previous stages and partly analysed data. Time was availed by the hosting organisations for the researcher to discuss with the learners and lecturers.

Researchers adopting thematic analysis do so following any of the three identified typologies, which are: coding reliability (Boyatzis, 1998; Guest, MacQueen & Namey, 2012), reflexive or organic coding (Braun & Clarke, 2006, 2013, 2017) and codebook (Smith & Firth, 2011; Brooks, McCluskey, Turley & King, 2015).

Coding reliability is adopted by researchers implementing qualitative techniques, but with a positivist orientation (Boyatzis, 1998). However, coding reliability presents challenges of being too structured, limiting reflexivity and explorative focus. Indeed, coding reliability's strength of using multiple coders is a good measure of precision of code; the current research suggests

that subjectivity is an issue under such circumstances. Therefore, it is by chance that researchers can arrive at a desirable destination. For reasons stated, coding reliability is well appreciated but will not be adopted.

The second typology, codebook, uses coding frame and operates in the middle of reflexive coding and coding reliability. Three main stages in codebook involve data management, descriptive accounts and explanatory (Smith & Firth, 2011). Although codebook typology is well-suited for this study given the fact that pragmatic assumptions are adopted by the researcher, it is argued in the present study that coding frame is designed with a potential of obscuring some themes. Therefore, coding frame is not well-suited to the present study.

The third typology which researchers can use is reflexive coding. Reflexive coding allows combining, splitting and dropping codes at any given point and is adopted by researchers from qualitative orientation. Reflexive coding starts with codes which are developed to themes (output of synthesising, see Figure 4.5). Reflexive coding is iterative and flexible, allowing the researcher to get a deeper understanding of data through immersion. Instead of reliability of codes, Braun and Clarke (2013) advocate for prevalence. Admittedly, the issue of prevalence can pose some weak links to the critics of reflexive coding. Braun and Clarke (2006) suggest using phrases that reflect existence of a code/theme. However, in any case, quantification of code does not render importance of the code. Consistency in judgement and providing data to participants provide a potential way of dealing with issues of reliability (Boyatzis, 1998).

There are many ways of conducting thematic analysis, and it is important for researchers to be consistent in the way they carry out the process throughout. Although the three typologies operate from different philosophical assumptions, Smith and Firth (2011:53) argue that: “Debates about the epistemological and ontological perspectives underpinning qualitative methods can overshadow the need to ensure that qualitative studies are methodologically robust”. In some instances, overlaps and similarities can be drawn in the different typologies. Brooks *et al.* (2015) draw similarities in flexibility and hierarchical codes between template analysis and reflexive coding. On the contrary, themes are developed at early stages of analysis in template analysis compared to themes being output in reflexive coding. It is, therefore, important for the researcher to adopt processes which address the research question while providing a comprehensive understanding of the phenomenon rather than sticking to one way of doing thematic analysis. Given the stated advantages of reflexive typology, it is adopted in

the current study utilising Braun and Clarke's (2006) six stages of thematic analysis, as shown in Table 4.6.

**Table 4. 6: Applying six stages of thematic analysis**

<b>Stage</b>	<b>How the process proceeded in the current study</b>
Familiarisation of data	Transcribed the responses from participants. The researcher did not engage a third party to transcribe.
Generating initial codes	Used short notes (memos) collected during data collection, coded data iteratively as suggested (Dey, 1993; Tuckett, 2005; Braun and Clarke, 2006), and constantly compared the codes.
Generating themes	Used the key questions to sort and organise codes, identify categories and generate sub-themes through identifying relationships.
Reviewing themes	Organised categories and sub themes from which relationships are identified. Some of the themes are merged and others dropped but with constant reference to the sub question.
Defining and naming themes	Used sub-questions key phrases in naming themes
Producing the report	Wrote the results

(Source: Adopted from Braun and Clarke (2006:87))

#### **4.10.3 Pragmatic informed thematic analysis**

Influenced by Peerce's pragmatic perspective, the present study considers multiple realities from the empirical setting with learning efficiency as reality from the participants' perspectives. The research questions used in the present study are both ontological and epistemological in nature. Through use of WhatsApp application, the researcher expects to obtain realities from the learners. Seeing (Boyatzis, 1998) participants provides a mechanism for implementing actions and problem solving. The thought is mirrored through coding as actions are implemented and interpretation of the thought reflects knowledge as the generated actions are geared towards solving learning efficiency issues. The present study is of the view that knowledge is constructed together with participants in a natural setting instead of being discovered, as highlighted by other researchers (Crotty, 1998, Blaikie, 2010). Moreover, pragmatism stresses knowledge generated put into use for changing the society and in the context of the present study, this is the NCV sector.

Reality obtained through the social participation of learners, lecturers and subject experts within the WhatsApp groups can potentially be attained since all parties involved have a shared meaning similar to those in community of practice. Multiplicity of constructions from several participants is possible depending with what each of the learners and lecturers see as important in addressing the problem of learning efficiency. Although encoding of multiple constructions can be challenging apart from being subjective, thematic analysis attempts to represent all important views from the data. Thematic analysis is not a numbers game. Moreover, interpretations relating directly to the empirical situation (Baskerville & Pries-Heje, 1999) are

more credible since it involves a dialectic process with participants learning from each other despite the researcher leading in theorising. The researcher's responsibility lies in being in control of the research and the final product (Morse, 1998). However, control does not mean influencing. When researchers take results back to participants (member checking), they still have a chance to modify the results.

In the present study, the researcher implemented member checking (Creswell, 2009) as a way of ensuring transferability and credibility of constructions. Furthermore, constant comparison and iterative implementation of analysis allowed validation of findings. Similar to abduction, thematic analysis is not hindered by rules (Braun and Clarke, 2006). Abduction is compatible with the pragmatic paradigm adopted in the current study which allows one to view changing realities (Cherryholmes, 1992; Maxcy, 2003) observed during cycles of action research. Following Braun and Clarke (2006), the adopted thematic analysis is presented using a diagram (see Figure 4.4 on the next page) and key concepts defined in section 4.10.3.

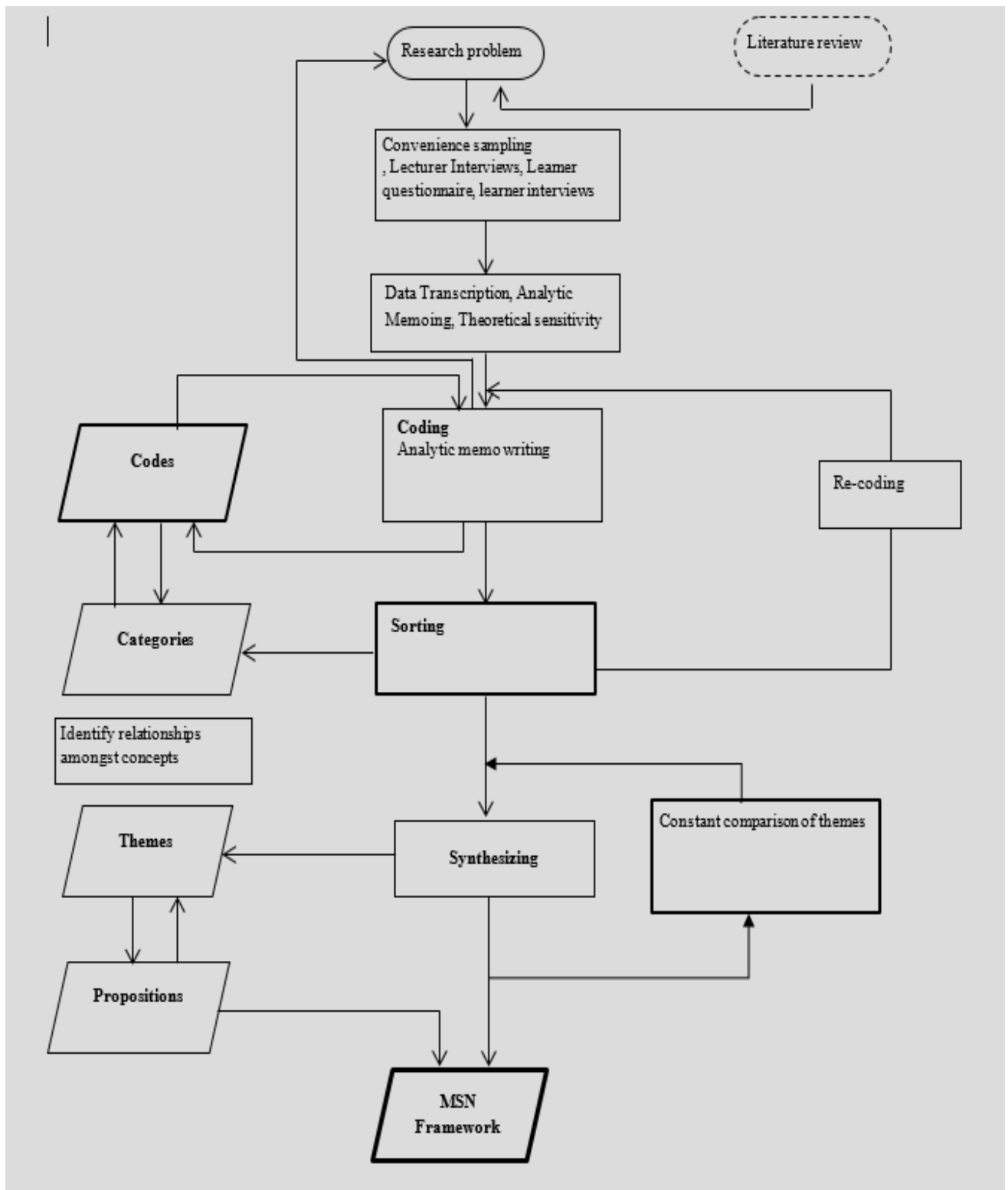


Figure 4. 4: Thematic analysis process adopted

To give a better understanding of the associated processes, the current section provides a detailed understanding of the process shown in Figure 4.4 by defining the key stages: coding, sorting, and synthesizing.

#### **a) Coding**

A code can be a word, phrase or sentence used in assigning labels to transcribed data. Saldaña (2016:4) states that a code “symbolically assigns a summative, salient, essence-capturing, and /or evocative attribute for a portion of language-based or visual data.” Gibson and Brown (2009) identify two types of codes as *a priori* and empirical code. Braun and Clarke (2006) refer to the two as thematic coding and inductive coding. *A priori* codes are established before data collection and may have arisen from literature review, other research or research questions, while empirical codes are developed as the process of data analysis occurs (Gibson & Brown (2009). *A priori* codes allow the researcher to be more focused and are goal-oriented. However, there is a danger that the researcher may miss important realities or emerging themes as the research progresses. Coding specifically for the research question can cloud important themes or codes from emerging as researcher becomes narrowly focused. On the other hand, empirical codes enable the researcher to gain deeper meaning and respond to emerging themes despite posing a danger of getting substantial themes, some of which might not be related to the research question. The stance adopted in the current study is to approach the data with the research question in mind since the ultimate goal was to generate actions solving the problem affecting learning efficiency among NCV learners. In sync with the research question, orientation is descriptive coding where sub-categories of codes are generated depending with the sub- questions. As reflected in Figure 4.4, the coding process is iterative.

In reference to “inductive thematic analysis”, Braun and Clarke (2006:83) emphasise that coding of data does not occur in emptiness. Nonetheless, the current research prefers to corroborate preconceived ideas and those emerging from the data for the purposes of analysing data with all possibilities.

Nonetheless, this is not to say that preconception must lead analysis as it may lead to forcing of data, as suggested by Glaser and Strauss (1967) in grounded theory work. It will be argued that the ultimate purpose of coding should be answering the research question, understanding phenomena, developing construct or theories (for grounded theory researchers). The coding

process in thematic analysis is heuristic (Saldaña, 2016) and cyclical (Braun & Clarke, 2006). The issue of *a priori* or empirical codes will eventually be dismantled as analysis proceeds.

Notwithstanding the different coding typologies, whether theory-driven or data-driven, coding should be able to produce themes that are important in the interpretation of the phenomena and presentation of the results (Boyatzis, 1998). Nonetheless, it should be noted that there are no fixed coding methods which a researcher must adopt since research goals differ, with some of the methods overlapping (Saldaña, 2016).

The codes should be recorded in a code book since the number of codes grows exponentially as the process proceeds. Saldaña (2016) recommends use of software for coding in situations where the research involves extensive fieldwork. The current study used NVIVO software in conducting thematic analysis because of its ability to outperform manual coding methods in storage, reorganising and manipulation of data.

#### **b)     Sorting**

As shown in Figure 4.4, the output of sorting is categories which have a higher abstraction than the codes. Again, the process of constant comparison of codes and categories is repeated until saturation is reached. Categories encompass groups of coded data (Saldaña, 2016). Sorting allows the researcher to start the process of identifying patterns from data.

#### **c)     Synthesising**

Synthesising produces concepts and themes which is a higher abstraction of categories. Boyatzis (1998:4) defines synthesizing as “a pattern found in the information that at minimum describes and organises the possible observations and at maximum interprets aspects of the phenomenon”. Themes or concepts are used to construct a theory (for grounded theorist) or assertions and propositions which are comprehensive in understanding the phenomena of interest. Themes can be viewed in their abstraction with semantic themes providing surface meaning as reflected by participants. In latent themes, the researcher goes deeper by identifying any underlying assumptions. Production of latent themes allow refining of themes through collapsing, dropping or combining them based on their relationships.

#### **4.10.4 Challenges to thematic analysis**

Thematic analysis has been criticised as a weaker method of analysing data in comparison to other forms of qualitative techniques such as discourse analysis, grounded theory and narrative analysis because of lack of “identifiable heritage” (Bryman, 2008:554). Consequently, thematic analysis is criticised on the grounds of demarcation from other qualitative techniques. Indeed, quality of thematic analysis rests on the skill of the researcher, for instance experienced researchers have the capability to produce latent themes which are rich in meaning. While acknowledging the challenges that thematic analysis poses to novice researchers since it does not detail how themes are developed, it is a powerful technique of analysing qualitative data which can be well understood by researchers from different orientations. The simplest skills recommended (Boyatzis, 1998; Braun & Clarke, 2006) are to approach data with openness and possessing some cognitive competencies. A variety of skills allows the researcher to project into participants’ experiences (Boyatzis, 1998). Absence of such skills can result in no analysis or incoherent themes (Braun & Clarke, 2006).

While use of thematic analysis keeps growing, Braun and Clarke (2006) highlight the danger of using themes in data collection process. Admittedly, using themes at early stages presumably best works for researchers adopting theory-driven codes who assume that themes are discovered rather than developed. However, theory-driven codes tend to weaken the analysis and hide lived experiences from emerging data (Gibson & Brown, 2009). As a result, there is danger in producing under-developed themes (Connelly & Peltzer, 2016). One possible way to avoid such a dilemma would be to construct themes as the researcher interacts with participants and data. Even if it is assumed that themes are like diamonds waiting to be picked (Braun & Clarke, 2016), not everyone has the potential to pick one. Still researchers can pick diamonds of different qualities. Undeniably, thematic analysis remains a powerful method best suited for pluralistic approaches such as participatory action research.

#### **4.11 Ethical Issues**

‘Research ethics’ involves appropriation of researchers’ behaviour in the process of inquiry. Addressing ethical issues ensures that research subjects are treated fairly with dignity and report findings reported honestly. According to Blumberg, Cooper and Schindler (2008:154) “ethics is the study of the right behaviour and addresses the question of how to conduct research in a moral and responsible way”. Research ethics deals with subjects that possess the ability to experience distress in any form (Leedy & Ormrod, 2010).

Researchers such as Bryman (2008), Blumberg *et al.* (2008), and Leedy and Ormrod (2010) group ethical principles into three sections:

- Protection from harm
- Informed consent and right to privacy
- Honest reporting

Ethical principles do overlap and as such, any researcher must endeavour to address all concerns that are associated with each sector that the research encroaches on. Research participants should be made aware of any associated psychological or physical distress which may be associated with taking part in the inquiry so that they know some of the consequences that can be associated with the study. It is an ethical violation when researchers carry out an inquiry where there are associated dangers. Undeniably, researchers carrying out a sponsored inquiry may attempt to please funders by producing favourable results which, in a way, violates the dignity of respondents (Hussey & Hussey, 1997; Leedy & Ormrod, 2010) and positions the research in an ethical dilemma. Ideally, a researcher is expected to operate within the middle ground of code-governed principles and ethical relativism (Bryman, 2008; Blumberg, et al., 2008; Leedy & Ormrod, 2010). In the current study, participants had to sign consent forms to indicate awareness of any anticipated harm. For the purposes of this study, ethical clearance from the university and empirical setting was sought before commencing the research (refer to Appendices 2 and 3).

The second principle of informed consent ensures that participants are well informed on the purposes of the research. Participants ought to be educated that they are allowed to pull back from the study at any phase with no repercussions. In the current study, learners were free to join the WhatsApp group with their telephone numbers and results were not attached to real names. Although it was anticipated that some learners might not want to change the profile settings specifically for the Computer Programming WhatsApp group, the researcher had to ensure that the names would not be published anywhere. An informed consent form was designed for the purposes of seeking learners', lecturers' and parents' approval. Participants had to sign the consent form before taking part in the research and hard copies were kept safely.

The third principle deals with honest reporting and writing of findings. Hussey and Hussey (1997) points out that it is unethical to use findings in more than one study and publish them as separate study or fabricate results to fulfil a specific goal (Leedy & Ormrod, 2010). In the case of the present study, research data will be kept as per agreed standards in ethics statement with screenshots attached (see Appendix 12A-E). However, all results can be accessed whenever requested. An ethical clearance letter from the university is presented to the TVET colleges where data is collected. Both ethical clearances (one from the university (see Appendix 2) and others from TVET colleges where data was collected are attached<sup>6</sup>.

#### **4.12 Data management**

Managing research data is crucial in research (Gibson & Brown, 2009) since readers can easily reference or track what has been collected and analysed during the research life span. Huberman and Miles (1998:180) define data management as “the operations needed for systematic, coherent process of data collection, storage and retrieval.” Three key processes constitute data management: data reduction, display and conclusions (Huberman & Miles, 1998). Researchers are expected to manage the process of data storage and retrieval into a more plausible way for the purposes of avoiding mislabelling, incorrect coding and linking. Three process of data reduction, display and conclusions guides data management ensuring that the process is done in line with ethical consciousness. In the present study, the research question, objectives and literature review all contributed to reducing the data during the process of data collection and the analysis of the research findings.

Researchers must use systematic ways of storing interview data, research records and observation diaries to avoid miscoding and mislabelling. Flick (2014) suggests use of indexing while preserving participants’ confidential information such as names. In the case of the current study, the four participating colleges from which participants came from were given the followings names: SC TVET College, FB TVET College, CC TVET College and BC TVET College. The actual college names were avoided as part of ethics consideration and in accordance with the agreement set out by the college principals as a condition to allow the researcher access to participants.

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<sup>6</sup> Uploaded together with other documents because size of files

WhatsApp groups created for the participants at each site were prefixed with CP with reference to Computer Programming. Since FB has two IT campuses offering NCV IT, CP-FB1 and CP-FB2 are the names used to refer to the different groups on WhatsApp. In line with confidentiality, biographical information of participants was replaced with pseudonyms as recommended (Gibson & Brown (2009)). Interview recordings and other records were kept in password-protected online platforms availed through the university network. As backup, hard copies were kept at home in a locked cabinet. While acknowledging that as research progresses, multiple copies of research data might be created, all data for current research was kept in password-protected files and at the university within the department in a safe to avoid access to unauthorised people, which might harm participants (Gibson & Brown, 2009).

#### **4.13 Chapter summary**

The present chapter highlighted the philosophical assumptions, paradigms, research strategies, research choices emerging propositions and ethical considerations. Justifications have been articulated to position the research argument in theory. Literature on methodology highlighted the possibility of merging concepts of action research and mixed methods. The research strategy highlighted concurrent embedded mixed methods as a strategy of choice because of its complementarity association with mixing qualitative and quantitative data. Although challenges are anticipated arising from research strategy choice, the benefits of using the method offsets mono-method techniques. Ethical clearance was sought in order to make sure that moral principles were practised during the research process without causing any distress to the research subjects.

## CHAPTER FIVE: FINDINGS

### 5.0 Introduction

In the present chapter, findings are presented on learning efficiency, intervention of extending instructional time using WhatsApp — an instance of MSN — contact styles and the need for integrated framework from the data collected using methodologies discussed in Chapter Four. Data collection and analyses was done in three phases with participants drawn from five TVET colleges in the Western Cape Province. Thematic analysis (for qualitative data) and descriptive and inferential statistics (for quantitative data) were used for analysing the data collected. Findings articulated in this chapter attempt to answer the research question and the sub-questions; The main research question asked:

*How can instructional time be extended using Mobile Social Networks (MSN) to enhance learning efficiency of Technical Vocational Education and Training learners?*

Research findings are presented according to phases (plan, act and observe and reflect) which form part of Kemmis and McTaggart’s (2005) participatory action research. Reflections at each stage were used to refine the actions in the succeeding phases. Table 5.1 presents a summary of the data collection activities and timelines in each of the three phases.

**Table 5. 1: Data collection phases**

Stage	Timeline	Method	Technique
Phase 1	July 25 2018- August 25 2018	Documents (Theory & Practical test 1 Marks & attendance registers, Lecturer Timetable)	Descriptive statistics
		Lecturer interview (5)	Thematic Analysis
Phase 2	August 26 2018 –25 September 2018	Analysis of Theory & Practical test 2 & ISAT, Attendance registers	Descriptive statistics
		Learner Questionnaire (73)	Thematic Analysis & Descriptive statistics
Phase 3	26 September 2018- November 30 2018	Internal exam & ISAT Results, **Final results	Descriptive and Inferential statistics
		Learner Interview (32)	Thematic analysis

\*Final results only discussed on number of passes

To further position himself in the research findings, the researcher put forward his position and any biases in section 5.2. Researchers such as Leedy (1997); Blaikie, (2010) and Creswell, (2009) emphasise the importance of clarifying researchers' position and bias for the purposes of informing the readers of the angle from which the findings are reported. Not only does it present a researcher' view, but presents an honest account (Leedy, 1997). Nevertheless, this is not to say objectivity of the phenomena was not considered, but indeed, it would be naïve to suggest that research is immune to any influence, be it from the researcher or from society. In addition, presenting researchers' position enlightens readers but makes the researcher aware of his or her position and guard against any possible inherent influences.

### **5.1 Researcher's background**

The researcher's experience as a lecturer in the field of technical and vocational education space has been instrumental in shaping his thinking. Since joining TVET sector in 2009, he has been teaching Computer Programming and was appointed as the internal examiner for the subject in the Western Cape Province from 2010 to 2017. It is his belief that over the years, his understanding, observations and experiences in NCV have grown exponentially to an extent where he can speak credibly regarding learning efficiency issues. He has occasionally participated in TVET debates and discussions on UNESCO-UNEVOC TVET forums.

Given the working experience and familiarity with the empirical setting, his position resonates between that of a faithful reporter, dialogic facilitator and mediator of languages. He acknowledges bringing certain values to the study. Nonetheless, great effort was put in place to attain some degree of objectivity even though the influence shapes how he interprets the findings.

The researcher began this study with the view that a significant amount of instructional or lesson time is lost during the year due to disturbances which occur frequently during normal teaching hours subsequently affecting learning efficiency. Literature (Bloom, 1974; Abadzi, 2009; Lavy, 2015) has it on record that challenged economies suffer more instructional time loss as compared to those institutions situated in better economies. The sample for the current study contained clusters of learners staying in more challenged economies such as Khayelitsha, Steenberg, Philippi, Manenberg and others. In addition, being technically savvy, the researcher upholds the belief that MSN could potentially lessen the challenges experienced by learners after the disruption of instructional time. However, he commenced the study with some doubt

about the power of MSN on learner-to-learner interaction in the absence of a lecturer. Regarding philosophy, he concurs with constructionist researchers who believe that knowledge is constructed through interaction. Needless to say, as a practitioner, he upholds an outcome-oriented philosophy such that his study has practical benefits to the learners and the TVET sector at large. Here, he infers having adopted pragmatism because of its quest to make a practical contribution to the participants. Section 5.2 provides a case description from which the sample of the current study was taken.

## **5.2 Case Description**

The study sample was drawn from the public Western Cape TVET colleges. Section 5.2.1 to 5.2.4 provide a detailed description of each of the participating colleges.

### **5.2.1 Profile of SC TVET**

SC TVET College is situated along the Garden Route and draws most of its learners from George and Mossel Bay. The college was formed in 1994 following amalgamation of three former technical colleges. The college was selected because of convenience since it is closer to the researcher's home, though being the furthest of the five locations. In addition, it is among the three Western Cape TVET colleges the researcher classified as rural. In terms of enrolment, SC is the smallest public TVET College in the Western Cape (DHET, 2017).

According to attendance registers supplied by the Computer Programming subject lecturer for the year 2018, there were 10 registered full-time learners for NCV Level 4 IT with an additional two registered for exams only, also referred to as part-time learners at SC TVET. However, the part-time learners were not included in the research data since they attended college only during test and examination dates. Another TVET college classified as rural in the Western Cape offering NCV IT Level 4 is BC TVET College.

### **5.2.2 Profile of BC TVET**

BC TVET is situated in the Western Cape and is among the three TVET colleges classified as rural, with most of its learners from Strand, Paarl, Caledon, Stellenbosch, Eerste River, Somerset West, Worcester and other surrounding locations. Although the total figures for NCV learners seem close to those of year 2015 (DHET, 2017), there were only 12 registered learners for NCV Level 4 IT in the year 2018. For the present study, the researcher selected BC TVET as it was classified as rural and because of its proximity.

### **5.2.3 Profile of FB TVET**

FB College services mainly the South Peninsula area, drawing its learners mainly from Fish Hoek, Simon's Town, Retreat, Steenberg, Muizenberg, Mitchells Plain and Khayelitsha. FB has five campuses, with IT offered at two of the campuses. FB was selected because of its proximity and classification as urban. The college has two classes of NCV Level 4 IT, one at each of the two campuses. In the present study, the researcher constantly refers to each as a separate college for purposes of distinction. FB1 draws most of its learners from the areas such as Fish Hoek, Retreat, Muizenberg, Simon's Town and others. FB2 draws most of its learners from Khayelitsha, Mitchells Plain and other surrounding suburbs. According to the attendance registers for year 2018, FB1 had 21 while FB2 had 30 full-time NCV Level 4 registered learners. However, only 20 learners from FB1 and 28 learners from FB2 took part in the study.

### **5.2.4 Profile of CC TVET**

CC TVET College is one of three urban public TVET colleges in the Western Cape apart from FB and NL which is not included in this study since it does not offer a NCV IT course. CC TVET draws most of its learners from the Cape Flats, which was predominantly set aside for the non-white population group during the Apartheid regime. Most of the learners at CC are from Manenberg, Athlone, Hanover Park, Khayelitsha, Gugulethu and surrounding suburbs. The site was chosen for two main reasons: the researcher has been a lecturer of Computer Programming at the college since 2009, and it is one of two urban colleges offering NCV IT in the Western Cape. There were 21 registered learners studying NCV IT Level 4 as reflected by class registers extracted from ITS. However, one learner withdrew and the other decided to sit for exams although they were not removed from the class registers.

## **5.3 Gaining access into the research setting**

Gaining access into an organisation for the purposes of research must conform to principles of ethics. However, as Bryman (2008) puts it, the process of approval can be fraught since organisations perceive that research takes participants' time and might be regarded as an intrusion (Cohen, Manion & Morrison, 2007) into organisation affairs. Researchers such as Bryman (2008), Gibson and Brown (2009), and Saunders et al. (2009) highlight the importance of seeking access from organisations and making sure that the intentions are well known. In the current study, challenges in gaining access was encountered at CC only. Permission was granted only after several escalations.

## 5.4 Planning and preparation of visits

After gaining entry, the next step required a great deal of planning. It is important to plan and establish relations in advance so that every visit is seen as worthwhile by the organisation. As suggested (Cohen et al., 2007; Bryman 2008; Saunders et al., 2009), gaining access requires early planning and preparation. Fortunately, for this study, most of the lecturers who took part were briefed of the intention in the previous year during a provincial IT focus group meeting for the Western Cape organised by DHET. After access was granted, the researcher then visited the campus and presented his aims, plans and procedure of actions and requested participants to sign consent forms. All documentation, including ethics approval from university, from college principals and questionnaires used in the first phase, were provided to the participants, all of whom were above the legal age of majority; hence, none of them needed parental consent. A PowerPoint presentation assisted in explaining the purpose of the study to the participants.

Notable mention goes to staff at SC and FB1 in opening up communicative space. The Programme managers introduced the researcher to the participants and highlighted the importance of taking part in the study. Consequently, this might have consistently helped to smooth communication channels with the participants. As highlighted by Saunders *et al.* (2009:172), “gatekeeper can play an important role, adding credibility and introducing you and your research project to the relevant people and creating an awareness of your research”. The researcher observed that participation and respect experienced from SC and FB1 learners and lecturers might have been attributed to the first encounter facilitated by the respective Programme Managers. Table 5.2 presents a summary of the total number of consent forms which were signed on the first visit after presenting the purposes of the research to the participants. As reflected in Table 5.2, FB2 had the highest number of participants (n=29).

**Table 5. 2: Total number of signed forms**

Name of college	Signed consent forms by		Total
	learners	lecturers	
<b>SC TVET</b>	9	1	10
<b>BC TVET</b>	10**	1	11
<b>FB TVET</b>	<b>FB1</b>	1	20
	<b>FB2</b>	28	29
<b>CC TVET</b>	19	1	20
<b>Grand Total</b>			90

\*\*2 joined later

Since action research is cyclical (Tharenou *et al.*, 2007), this study had three phases as highlighted in Table 5.1. The next section provides findings from Phase 1.

## **5.5 Participatory Action Research Phase 1**

In this phase, findings from timetables, attendance registers, Term 1 scores and lecturer interviews are reported. Although the unit of analysis for the study are the NCV learners, the researcher saw fit to interview the lecturers first on the basis that they are the custodians of instructional time, and awareness on learning efficiency at class level rests on them. Section 5.6 provides demographic information for the lecturers interviewed.

## **5.6 Demographics of lecturer participants**

All the lecturers at the five colleges agreed to take part in the study; their demographics are summed up in Table 5.3. For the purposes of anonymity, lecturer IDs were used instead of the actual name. Among the lecturers interviewed, LSC01 was also the head of the Information Technology department at SC College and had worked in the NCV programmes since its inception. LCC1MM was not teaching programming at the time of data collection, but was asked to assist the learners since he had taught the subject before and agreed to be included also in the WhatsApp group.

A striking commonality was that all lecturers were male and possessed a minimum of a diploma in Information Technology which is pegged at NQF Level 5, suggesting that all had minimum qualifications (see Table 5.3) as stipulated by DHET. Although, two lecturers did not have a teaching qualification, they had IT qualifications. The findings match those (to a lesser extent) reported in earlier studies (Wedekind & Watson, 2016; Gewer, 2016) regarding non-possession of teaching qualifications among TVET lecturers. However, three lecturers (LSC01, LBC1FV and LFC2WM) from the five interviewed had both a teaching qualification and IT qualification, as encouraged by the South African Department of Higher Education. Notably LSC01, LFC2WM, LFC1GM and LCC1MM indicated that they were all furthering their post-graduate studies in Information Technology at the time of the current research.

**Table 5. 3: Lecturer demographics**

Lecturer ID	Position	College	Gender	Qualification	NCV Experience
LSC01	Program Manager	SC	Male	Degree + Education	>10 Years
LBC1FV	Lecturer	BC	Male	Degree + Education	>4 Years
LFC1GM	Lecturer	FB1	Male	Degree	>6 Years
LFC2WM	Lecturer	FB2	Male	Degree + Education	>10Years
LCC1MM	Lecturer	CC	Male	Diploma	<3 Years

### 5.6.1 Plan for Phase 1

Phase 1 aimed at identifying preliminary information from the lecturers involved on awareness of instructional time, their lecturing experience and existing MSN platforms (if any) used as interventions outside the lecturing timetable. Only LBC1FV from BC College reflected that they had started using Moodle, but acceptance from the lecturers and learners was below expected standards. Besides BC, no other colleges were implementing MSN platforms, which included the subject lecturer for Computer Programming. Again, this provided justification for using WhatsApp with the learners.

### 5.6.2 Act and Observe

All but one (LSC01) of the lecturers joined the WhatsApp group which the researcher formed for extending instructional time outside college. LSC01 cited privacy issues and needed a separate telephone line to use for WhatsApp. Quantitative data from timetable, attendance and test scores for Term 1 is presented first, followed by qualitative data from lecturer interviews. Lecturer interview responses were examined using thematic analysis following open coding process.

## 5.7 Analysis of Lecturer timetables for term 1

Lecturer timetables reflected disparities within the colleges regarding the number of periods allocated for Computer Programming per week and the duration of each lesson. Table 5.4 provides summary statistics of the Computer Programming lecturer timetable at each college.

**Table 5. 4: Timetable data for Computer programming at different colleges**

Name of College	Periods/Week	Period Duration	Total Minutes	Hours/Week
FB1	6	50	300	5.00
FB2	5	50	250	4.17
CC	6	50	300	5.00
BC	6	45	270	4.50
SC	7	50	350	5.83

As can be seen from the data in the second column of Table 5.4, FB2 had the least number of periods (n=5) per week while BC, FB1 and CC had the same number of periods (n=6) per week. It is apparent from Table 5.4 that colleges did not have similar timetables (see column 2-4). Although the number of periods for Computer Programming were equal in the case of BC, FB1 and CC, the duration of each lesson differed (see column 3) as did total number of hours allocated for the subject per week (see column 5). For instance, a surprising aspect reflected on Table 5.4 column 5 was the differences in overall time allocated for the subject between FB1 (5 hours) and FB2 (4.17 hours) despite being under same administration. Surprisingly, SC, which is classified as rural TVET and small in terms of enrolments, had the highest number of hours per week for Computer Programming as reflected in the last column on Table 5.4. This suggests that the amount of instructional time was not decided based on the number of learners in a class. Together, the results from timetables reflect that learners receive different amounts of time even though they write the same exam.

Further analysis reflected in Table 5.5 provides the total number of class periods which each college lost if they had followed the DHET calendar. The reasons given by the lecturers were late start of teaching and learning due to extended periods of registration. Data in column 4 reflected that SC had the highest number of periods not covered (n=22) in Term 1. When asked for reasons, it was found that the lecturer was away sick for that period. However, the college had no plan in place to recover the lost time. In contrast, FB1 had no periods missed, suggesting that time-tabling was adhered to more strictly as per DHET calendar.

**Table 5. 5: Number of days lost per college in Term 1**

<b>Name of College</b>	<b>College actual periods</b>	<b>DHET Calendar periods</b>	<b>Periods short</b>
<b>CC</b>	50	60	10
<b>FB1</b>	59	59	00
<b>FB2</b>	45	50	05
<b>BC</b>	48	54	<b>06</b>
<b>SC</b>	40	62	<b>22</b>

Overall, the results presented in Table 5.5 suggested that colleges were losing time at college level as well.

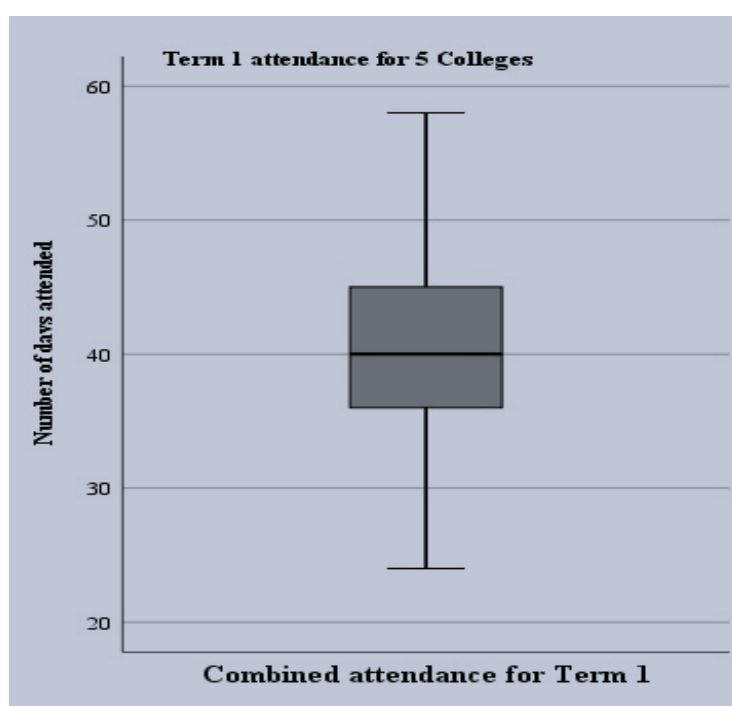
## **5.8 Analysis of Term 1 attendance**

Moving on to attendance, descriptive statistics for all learners (N=89) from the five colleges was analysed with the use of Statistical Package for the Social Sciences (SPSS) and a summary of results is presented in Table 5.6.

**Table 5. 6: Overall Descriptive Statistics for Term 1 attendance**

N	Range	Mean	Median	Standard. Deviation	Interquartile Range	Skewness	Std. Error of skewness
89	34	41.26	40.00	7.49	9.5	.346	.255

As shown in Table 5.6, there was a small difference between the measures of central tendency (mean =41.26 and median: *Mdn* =40.00) reflecting a right-skewed distribution. The range (n=34) together with standard deviation (*SD*=7.486) reflected a profoundly shocking variation between the highest and lowest attendance suggesting a very high instructional time differences. Range and standard deviation are not the best measures of variation or dispersion when data is skewed and with outliers (Bryman, 2008). To overcome the limitations of range and standard deviation, Figure 5.1 shows a boxplot depicting variation on attendance in Term 1. There were no outliers for combined attendance and distribution above the median was well spread compared to that below the median with a longer upper whisker.



**Figure 5. 1: Overall attendance from the 5 colleges**

To compare attendance per college, boxplots showing four equal-sized quartiles of 25% sorted distribution were used as reflected in Figure 5.2. As can be seen from the boxplots, CC had the lowest median (shown by a thick solid line separating the upper and lower quartile) of 35 periods per term. The left whisker was longer, indicating a left skew of the data since it is longer. For FB1 data was evenly spread though with a higher variation (*SD*=5.821). but with one weak outlier shown with a small circle. As for FB2, the data was spread more above the median with

a longer left whisker indicating left skew. There was an outlier with a frequency of 24 periods attended in term 1 for FB2 as shown by the small circle. Again, the mean was less than the median and mode, indicating a left skew. As for BC College, more distribution was concentrated below the median, but there were no outliers though with left skew. The most surprising data was from SC where attendance was same (n=40 periods) for all learners reflecting a symmetrical shape for the distribution with no variation ( $SD=0$ ). The results suggested a very distinct pattern for attendance. When asked, LSC01 said learner attendance was uniform because they move as a group and perhaps most of the time they decide together on whether to attend or not.

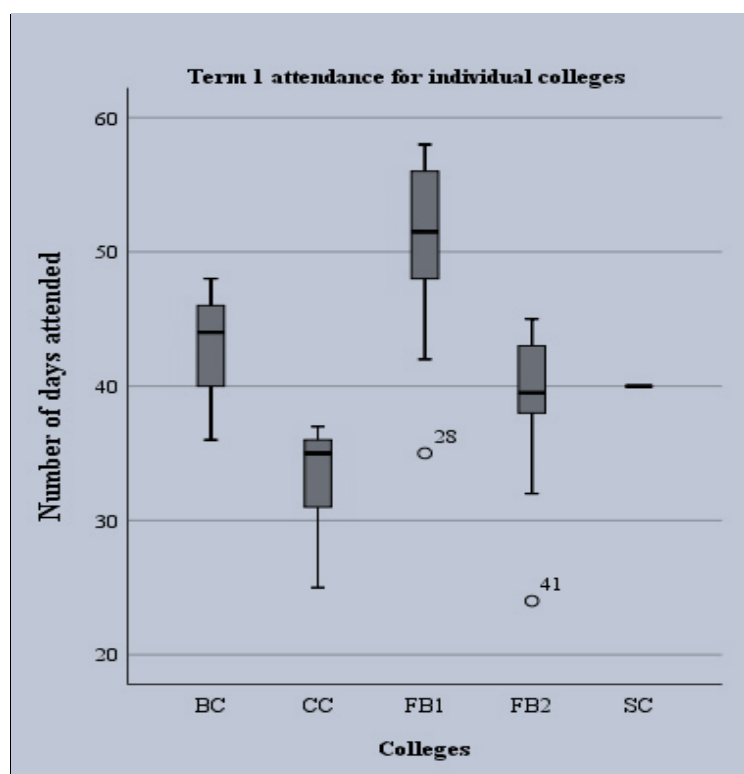


Figure 5. 2: Summary of attendance for each college

In summary, FB1 appears to have better attendance than all other colleges, with CC being the most affected as reflected by the boxplots.

## 5.9 Analysis of Term 1 Marks

Test scores were used to check if there was a connection between attendance and instructional time. Section 5.9. 1 to section 5.10 presents results from Theory test 1 and Practical test 1 tests were administered before the intervention of WhatsApp.

### 5.9.1 Comparative analysis of Theory Test 1 scores

The score of the Theory Test 1 is used in the current study to assess the knowledge component in learning efficiency Table 5.7 presents a summary of statistics for Theory Test 1 which was executed before the introduction of WhatsApp. From the table, it is apparent that the median for the colleges (refer to row 4) ranged from 60% to 70%, suggesting a quite fair performance. As reflected in Table 5.7, data for all the colleges was left-skewed and as such, relying on range and standard variation to report on dispersion was not the most plausible option. Interquartile ranges (IQR) were then used to deal with the limitations in order to present a clear picture of variation. Interquartile range is a value obtained after subtracting the lower value denoted as Q1 from the upper value denoted as Q3 of the middle 50% of the distribution (Bryman, 2008; Saunders, Lewis & Thornhill, 2009). The various IQR are shown in the last row of Table 5.7.

**Table 5. 7: Statistical summary of Theory Test 1**

	Colleges				
	CC	FB1	FB2	BC	SC
Number of learners	19	20	28	12	10
Mean	64.84	65.10	58.93	69.50	51.60
Median	<b>64.00</b>	<b>67.00</b>	<b>60.00</b>	<b>70.00</b>	<b>63.00</b>
Std. Deviation	11.80	15.75	13.07	9.58	27.93
Skewness	<b>-.301</b>	<b>-.296</b>	<b>-.393</b>	<b>-.530</b>	<b>-1.533</b>
Inter-Quartile Range (IQR)	<b>23</b>	<b>28</b>	<b>20</b>	<b>14</b>	<b>24</b>

Nonetheless, IQR possess the drawback of considering half of the values hence boxplots presented in Figure 5.3 are also used as they overcome some of the limitations. It can be noted from the boxplots presented in Figure 5.3 that BC performance was densely spread suggesting less variation compared to the other four colleges making the data more reliable for predictions. Data for SC was affected by the two outliers as indicated by an asterisk on the boxplots.

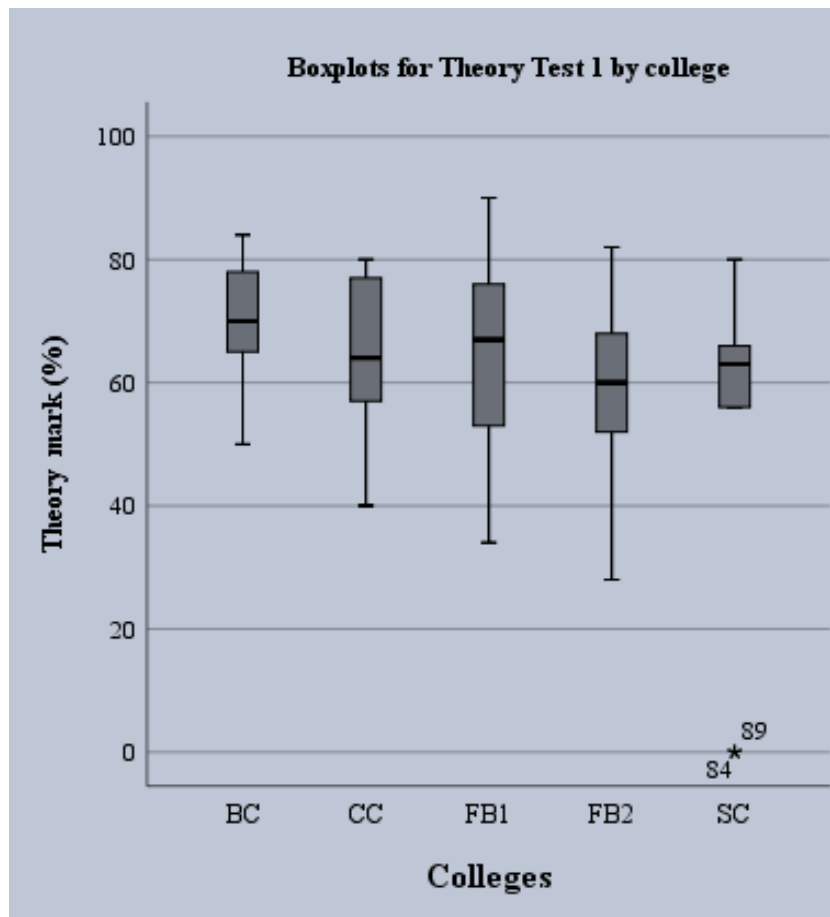


Figure 5. 3: Boxplots to show Theory Test 1 results for the five colleges

In summary, data for Theory Test 1 presented in Table 5.7 reflected that FB2 had the least performer (n=24%) after excluding SC because of the two extreme outliers reflected with asterisk as shown in Figure 5.3.

### 5.9.2 Analysis of Practical Test 1 scores

Another score used in assessing skill in the current study is the practical test. Turning to the analysis of the practical component, Figure 5.4 presents an overall variation for the practical mark for all participants (N=89). In general, the practical test mark had a higher median ( $Mdn=70\%$ ) with data values evenly spread within the middle 50% of the distribution giving an interquartile range of 29. There were two extreme outliers from the data as reflected by a small circle with two values representing position of the values. The data was left skewed.

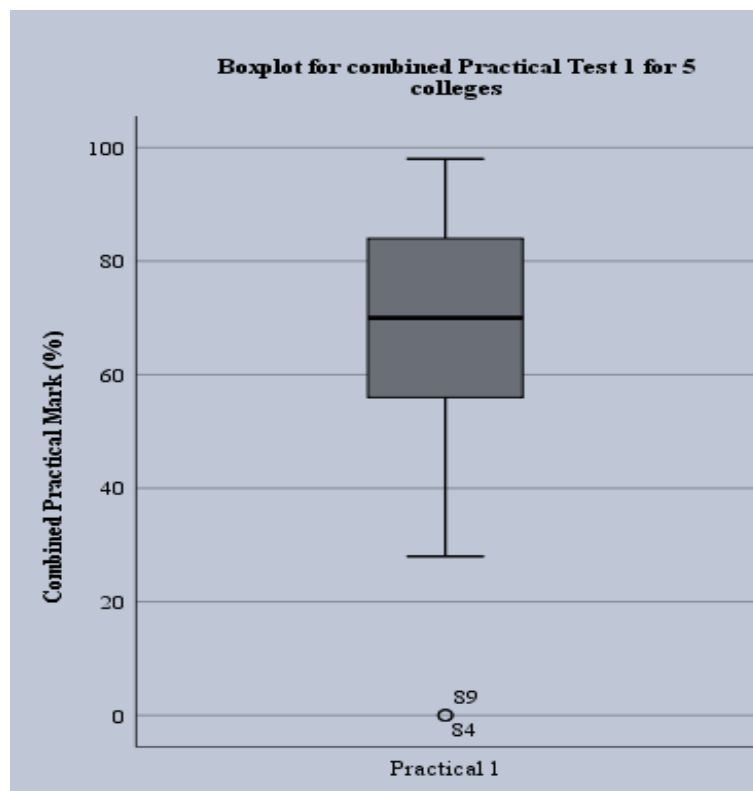


Figure 5. 4: Summary of performance for practical test

Individual descriptive statistics for practical scores at each college are presented in Table 5.8. Table 5.8 row 4 reflected that BC had the highest median ( $Mdn=86\%$ ) compared to the other colleges while FB2 had the lowest ( $Mdn=60\%$ ). As stated earlier, standard deviation is not the best in representing variation if data is skewed with possible outliers; hence, boxplots were also used as presented in Figure 5.5.

Table 5. 8: Summary statistics of Term 1 practical marks

	CC	FB1	FB2	BC	SC
Number of learners (N)	19	20	28	12	10
Mean	83.89	64.30	58.86	80.67	69.60
Median	<b>84.00</b>	<b>63.00</b>	<b>60.00</b>	<b>86.00</b>	<b>85.00</b>
Std. Deviation	7.88	18.52	7.53	17.44	37.24
Skewness	-.728	-.240	.222	-.873	-1,650
Interquartile Range (IQR)	8	29.5	12	29.5	34.5

Results were then presented using boxplots as shown in Figure 5.5. The distribution was negatively skewed for all colleges except for FB2. Moving to variation, SC data reflected highest dispersion ( $IQR=34.5$ ) while CC had a denser variation as reflected in row 7 of Table 5.8. Data for practical tests assisted to gain more understanding on the learner programming skills. Figure 5.5 shows one weak outlier and one strong outlier from CC but they were all

positive marks while the two extreme outliers for SC had very low marks ( $n=0\%$ ) for each participant. All five colleges had a short right whisker, indicating a denser spread of the last quarter of the distribution.

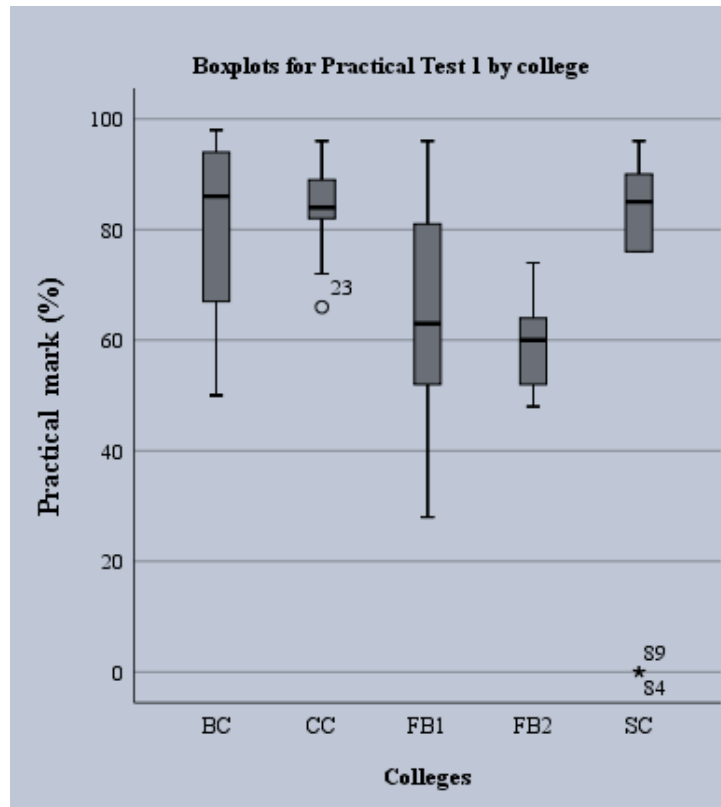


Figure 5. 5: Boxplots to show Practical Test 1 results for the five colleges

Overall, the boxplots reflected high performances in three colleges for practical test 1 with median greater than 80%. In section 5.10, Data was tested for association between attendance and test scores and results.

### 5.10 Analysing association between term 1 attendance and term 1 marks

In an attempt to measure association, a bivariate analysis of attendance and term 1 marks was done during Phase 1 using non-parametric measures because data was skewed. Data violated Pearson's assumption of linearity and had outliers (see Figure 5.5), hence Spearman's rho denoted with  $r$  was used (Hussey & Hussey, 1997). Output from SPSS on Spearman's correlation between attendance and theory test 1 marks for combined colleges presented in Table 5.9 indicated ( $r_s [89] = .047, p (2\text{-tailed}) = .665$ ) a very weak positive association and would not be considered statistically significant. Further analysis for term 1 attendance and practical test produced a very weak negative association. ( $r_s [89] = -.127, p (2\text{-tailed}) = .236$ ).

**Table 5. 9: Correlation statistics on overall attendance and Term1 marks**

N=89		Theory Test 1	Practical Test 1
Number of periods attended	Correlation	.047	-.127
	Coefficient		
	p value	.665	.236

Data was further analysed according to different colleges in an effort to understand association of performance and attendance. Spearman's correlation results for BC college showed a positive moderate association between attendance figures and Theory Test 1 results ( $r_s [12] = .678$ ,  $p$  (2-tailed) = .015) and would be considered of statistical significance. Interestingly, there was a very weak correlation between attendance and practical test 1 mark for the same period ( $r_s [12] = .111$ ,  $p$  (2-tailed) = .731) and would not be considered of statistically significant. Turning to CC college regarded as an urban TVET, the same test reflected a very weak negative correlation between attendance and theory test 1 during the same period ( $r_s [19] = -0.010$ ,  $p$  (2-tailed) = .97). The association would not be considered statistically significant. The same test reflected a very weak positive correlation between attendance and practical test 1 for the same period ( $r_s = .17617$ ,  $p$  (2-tailed) = .47063) and results were not statistically significant. Moving to results for FB2 another urban TVET, results reflected a very weak negative association for attendance and theory test 1 ( $r_s [28] = -0.06852$ ,  $p$  (2-tailed) = .72899) and not statistically significant. As for FB1 College, results for attendance and theory Test 1 ( $r_s [20] = .03117$ ,  $p$  (2-tailed) = .89622) indicated a very weak positive association for attendance and theory test and would not be considered statistically significant.

While correlation data does not suggest causality, it can be inferred that higher attendance can potentially give learners a greater chance of performing better in theory tests in comparison to cases where a learner's attendance is very low. In summary, statistical analysis for Phase 1 gave a broader picture on amount of time lost at college level and at individual level. In addition, statistical measures showed correlation results between instructional time and performance. Section 5.11 and 5.12 presents qualitative data from the lecturer interviews.

## 5.11 Analysis of Lecturer Interviews data

### 5.11.1 Understanding of Instructional Time discourse

Not one of the five lecturers interviewed knew of the total number of hours stipulated in the departmental documents (subject guidelines for Computer Programming). Surprisingly, this

included even LSC01, who held the position of Programme Manager at SC College as seen by his response when asked: “I am not sure as to how many [number of] hours are required as per syllabus. I have seven periods per week. There are about 50 minutes each.” LFC1GM’s answer also supported the finding when he said “Yaa. Every week there is seven periods with each period 55 minutes, seven sessions a week. Honestly I did not know that information.” The responses collected revealed that all the lecturers (N=5) interviewed were only concerned with the number of periods and duration of each period rather than the total amount of time expected for the subject for the year. Therefore, it makes evaluation of time loss very difficult for the lecturers if awareness of expected time is non-existent despite having policy documentation from the Department of Higher Education with all necessary information.

On the issue of previous pass rate for Computer Programming, many lecturers (80%) confirmed that the pass rate was low. Only one lecturer (20%), LSC01FV, mentioned that the pass rate had slightly improved. Further observation revealed that the Computer Studies department had at one point been closed because of low throughput at BC College, and Computer Programming was singled out as one of the subjects which had been an issue. This confirms the researcher’s earlier observation that learning efficiency issues was more synonymous with subjects such as Computer Programming. LFC1GM suggested that language was an issue as seen from the comment: “I think it even affects most of our black learners. Language ... language is an issue. The struggle to explain stuff. It’s little bit of a different issue with may be Coloured or white...”. While the researcher acknowledges the issue of language cited by LFC01GM presumably affecting majority of black learners, similar issues were not raised at the other campuses like SC, CC and FB2 where most learners were black.

### **5.11.2 Awareness of instructional time loss**

Awareness of instructional time loss gave justification of to the observed problem of instructional time loss stated in the research question which the lecturers acknowledged as discussed under subsequent headings: learning efficiency contributors and college interventions as presented in Figure 5.6. Awareness of instructional time was presented as a theme (see Figure 5.12).

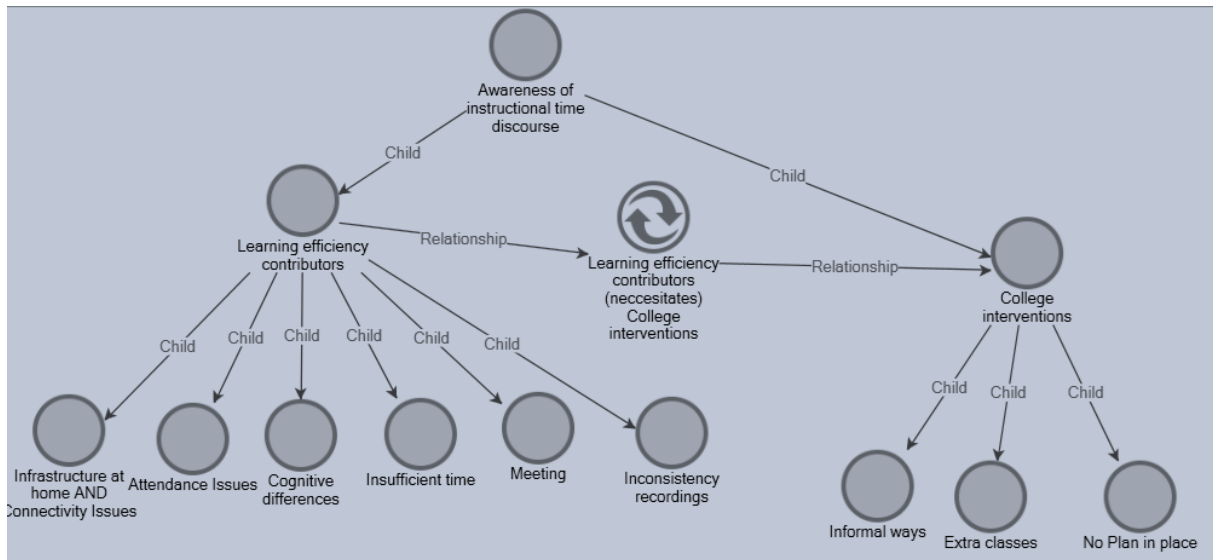


Figure 5. 6: Awareness of instructional time by lecturers

### 5.11.3 Factors contributing to learning efficiency

Only one lecturer highlighted that learners struggle with infrastructure and connectivity issues when at home to communicate with fellow learners and subject lecturers. Majority of lecturers (n=4) cited attendance issues as a great contributor for learning efficiency issues. Transport was cited as another contributing factor to attendance. Figure 5.7 shows a word tree query extracted from NVIVO showing comments regarding transport raised by the different lecturers. Contrary to expectation, transport issue was not mentioned at SC College. Possibly it is because there are no commuter trains in the town and majority of them are within a walking distance from the college so learners are not affected even by train delays (as in the case of other colleges) or taxi strikes. As expected, LF2WM, a lecturer from FB2, confirmed that some of the learners faced challenges of bus or taxi fares since their college was not within walking distance while those within the vicinity could not walk to college since there were a lot of muggings within the Khayelitsha area. Figure 5.7 shows some sentiments shared by the interviewed lecturers regarding transport issues.

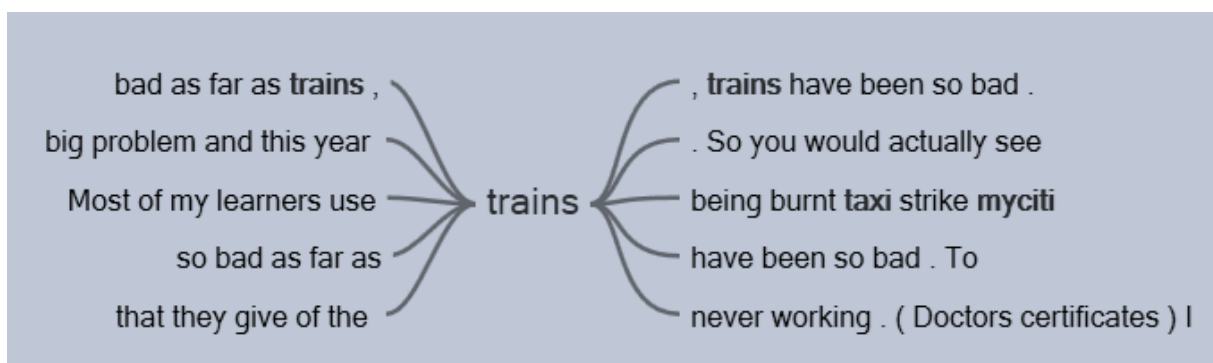


Figure 5. 7: Key lecturer comments on transport issues

Few of the interviewed lecturers (40%) suggested that cognitive difference was also a contributor to learning efficiency issues. For instance, LSC01 said “initially we enrolled post Matric in other words the guy needed to pass grade 12 now our current group are grade 9 passes and then we have a few with grade 10 and 11 very few are grade 12 so I think that is the biggest influence.”

In response to the question on perception on instructional time from learners’ viewpoint which contributed to insufficient time: the responses which emerged were coded as class disruption, bunking, health-related issues, non-attendance, and fake issues. One single striking observation was the issue of fake doctors’ slips that was raised by lecturers from SC and BC Colleges. Possibly, learners try to produce evidence to support their non-attendance which is then used to avoid deducting their transport allowances.

From the point of view of the lecturers, the researcher also observed that there was an inconsistency in recording of instructional time loss. At another college, the lecturer (LSC01) acknowledged that he had a formal and an informal register. Indications revealed that the informal register was the most accurate because on the formal one they wanted to create an impression that learners attend classes. Lecturers highlighted that the management would label them as failing to manage classes if they reported many negative issues from their classes. For instance, LSC01 said: “On the official list, we don’t want to mark the student absent, so we mark absent with a reason in terms of official recording ... but what I do is, on my system I have my own register”.

The data collected revealed that lecturers were aware that they were losing lecturing time as evidenced by the different reasons that came out and further evidenced by colleges’ attempt to put out some interventions though informal (SC and BC) and extra classes (FB2). Interestingly, although FB1 and FB2 are under the same administration, there was no indication of the same intervention of extra classes at FB1. This appeared to create dissatisfaction as observed from LFC1GM since extra classes come with additional income to the lecturer. LFC1GM lamented the overburden to the lecturer by the management by saying, “Actually the college *per se*, they don’t have anything but they just give an instruction to lecturers to say, find a way how you can actually recover the time lost”. Another college where there was no intervention, was CC (see Figure 5.8), yet the class attendance (see Figure 5.2) indicated that it was one of those heavily affected in terms of instructional time loss due to learner absenteeism. The project map below

shows a summary of sub-theme and categories as coded in NVIVO.

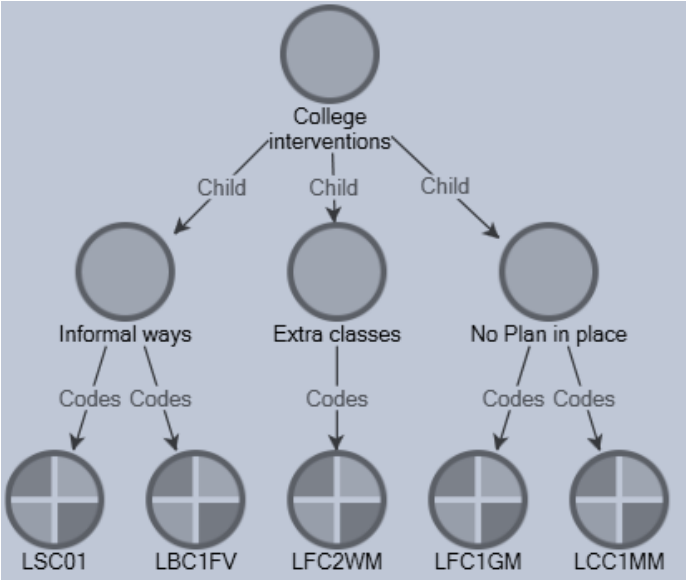


Figure 5. 8: College interventions

**5.11.4 Support for Integrated MSN Framework**

Questions 12 and 18 (see Appendix 6) given to the lecturers addressed research-sub question 4 stated as: *How can an integrated MSN framework guide TVET practitioners and policy makers in addressing Instructional Time issues?* The responses given resulted in three categories provided in Table 5.10: standardisation of platforms, support of platforms and fears or Excitement. A cross tab was pulled from NVIVO to indicate the cases and frequencies that each lecturer related to each of the categories. Most of the codes under ‘Fears’ included privacy concerns (n=4 references), bullying (n=1 reference), chaos (n=4 references) while activation of muted voices (n=1 reference) was cited as one of the excitements from use of WhatsApp, an instance of MSN. LCC1MM and LFC2WM strongly supported the use of a framework as seen by the coding references (N=6 and n=4 respectively). Not surprisingly, LSC01 did not support MSN platform citing privacy issues although he used to get what was discussed on the group from his learners.

**Table 5. 10: Lecturer response on need for a framework**

	Fears Or Excitement	Standardisation of platforms	Support MSN platforms	Total
LBC1FV	1	0	1	2
LCC1MM	4	1	1	6
LFC1GM	1	0	1	2
LFC2WM	3	1	0	4
LSC01	1	1	0	2
<b>Total</b>	10	3	3	16

The above codes were then clustered under one theme: Need for Framework. The next section presents findings on contact style.

### 5.11.5 Preferred Contact Style

Lecturers were asked on their preferred contact style which they would prefer to adopt on MSN platform in an attempt to answer research sub question: *How does the different instructional time contact styles affect participation?* Table 5.11 reflects lecturer responses on the type of preferred contact style. As can be seen in column 1, 2 and 3, majority of the lecturers preferred confluence (40% coding reference) or retroreflection style (40% coding references). Very few lecturers (20%) opted for projection.

**Table 5. 11: Results on contact style from lecturers**

	Confluence	Projection	Retroreflection	Total
LBC1FV	No	No	Yes	1/3 (33%)
LCC1MM	No	No	No	0/3 (0%)
LFC1GM	Yes	Yes	No	2/3 (67%)
LFC2WM	No	No	Yes	1/3 (33%)
LSC01	Yes	No	No	1/3 (33%)
<b>Total</b>	2/5 (40%)	1/5 (20%)	2/5 (40%)	5/15 (33%)

The data presented in Table 5.11 would indicate that either confluence or retroreflection style was regarded as a better contact style preferred by the lecturers to encourage student participation and collaboration using WhatsApp. Section 5.11.6 discusses usage of WhatsApp by lecturers in extending instructional time.

### 5.11.6 MSN Usage

The application used as an instance of MSN in the study was WhatsApp. The evidence collected strongly supports using MSN in teaching and learning, particularly with NCV learners studying Computer Programming. Data collected from the interviewed lecturers revealed that MSN was vital for: a) collaboration among learners beyond the traditional classrooms, b) extending instructional time, c) improving motivation and potentially improving different skills.

#### a) Collaboration

Lecturers suggested that when virtual discussions are done on platforms like WhatsApp, learners perhaps may potentially take ownership of their learning as they participate and also providing them with the support for certain subjects outside the traditional classes. LCC1MM lamented his observation by saying: “From what I have observed, there have been actually high activity on the WhatsApp group. Students [Learners] were sharing information. Students [Learners] were changing ideas”. This highlighted participation from learners’ side.

**b) Increasing instructional time**

Out of five interviewed lecturers, the majority (n=4) agreed that WhatsApp assisted in increasing instructional time through various ways. At SC College, the lecturer suggested that possibly because the class size was so small, learners were free to each other and they could participate. LFC1GM also confirmed that there were some learners from FB1 College who were predominantly quiet in class but had started posting content on WhatsApp probably because the classroom environment was too formal compared to the social platform. However, at CC College, there was still evidence that some learners preferred to remain silent instead of taking advantage of the platform. Possibly, these might have been the ‘hitchhikers’ or ‘social loafers’ (Kerr & Bruun, 1983; Kreijns *et al.*, 2003) who tend to wait for others to participate and then benefit from the discussions because evidence suggested that they were reading the messages as reflected by read and delivered reports on WhatsApp.

**c) Motivation**

Two lecturers (LSC01 and LFC1GM) acknowledged that WhatsApp group improved their motivation on the subject. LFC1GM commented that motivation arise from the learner being in the same circle with the lecturer by saying:

You know, sir, you are now at par with what we are and with what we want. And you get that ,, ehh,, more like respect from them as well. Since they will say no sir also uses this platform. And they will tell you no sir is like accommodated now, understands now. Like he has got that idea now that we communicate via this.

This was an indication that learners felt motivated once they knew that lecturers also get into their social space for a good reason.

It was surprising that the other lecturers did not mention motivation from their observation, for instance LFC2WM, who seemed negative on the impact of intervention. However, the same was not expected from LBC1FV who seemed to share the same sentiments with regards to learner support. The researcher believes that although he (LBC1FV) was positive about the invention, his effort was to see his project (Moodle implementation) flourish. So any idea which appeared to impede his efforts was not given enough support on the assumption that it was a platform competing against his delegated project.

**d) Improved skills**

The lecturers were asked whether there were some improvements in the ISAT practical subject

to ascertain if WhatsApp intervention helped to improve learner practical skill set in Computer Programming. Out of the five interviewed lecturers, four (80%) acknowledged that there were some marked improvements in ISAT execution compared to those that were done in the year 2017. For instance, LFC1GM stated that “I saw a big big benefit when I saw the marks of the ISAT was amazing because they collaborated, spoke to each other”. LFC1GM’s statement and those from the other interviewed lecturers strongly supported the idea that there was an improvement in practical skills. Although there was no explicit mention of skills like communication, soft skills and others, the researcher believes that WhatsApp might have helped to improve interpersonal relationship among learners through collaboration. Lecturers also raised other issues that were of great concern in the execution of NCV programmes and these are explained in the subsequent paragraph.

#### **5.11.7 MSN Non-usage**

Results collected from lecturers indicated three grey areas which potentially constitute MSN non-usage for learning purposes and these are: lecturer negativity, social loafing effect, connectivity issues and doubt as to potential of the intervention. For instance, LFC2WM stated: “the muted voices wait for something to get out of the discussions that might be going on. They don’t really say ‘let’s participate let’s come up with something’ and then there is that discussion and so on. They just wait.”

Contrary to expectations, there was evidence of lecturer negativity from one lecturer with regards to learning platforms citing doubt as to how MSN would trigger interest and problem solving skill. LFC2WM stressed that “Just seeing a screenshot of something, I don’t think someone might get assistance from that”. Out of the five interviewed lecturers, there was a distinct difference in appreciation of the use of WhatsApp group intervention in the early phases of the research. Notably, two lecturers (LFC2WM and LBC1FV) exhibited a greater density of negativity as reflected from their negative attitude during the first informal discussion interview.

As expected, connectivity issues were raised as another factor which has the potential to cause non-usage of MSN by learners. Contrary to his observation, the researcher had expected the issue to be voiced more by lecturers from colleges where there was no Wi-Fi connection (CC and SC). Instead, connectivity issue was also highlighted by LFC1GM from FB2, a college which had Wi-Fi connection for staff and learners while on the premises. In summary, there

was a mixed reaction on use of MSN.

### **5.11.8 Additional Issues**

LFC1GM raised concern of gender imbalance in NCV level 4 IT course. While this was not raised at other colleges, similar observation was made for BC College. Issues of gender imbalance are well supported by demographic data collected in phase 2 (refer to Figure 5.17) FB2 and CC College had an almost balanced gender distribution. In addition, the gender distribution of interviewed lecturers further supports the concern. None of the interviewed lecturers were female. However, this was not the focus of the study and as such, the issue was not interrogated further.

Of the interviewed lecturers, 40% highlighted existence of curriculum issues within the NCV Computer Programming subject. LSC01 highlighted that the subject guidelines do not clearly define scope of what is supposed to be covered leaving it to the lecturers do make own judgements. LFC1GM's comment supported the idea by stating that "Programming is so intensive. It's so intensive and if not given that same thing that we talking about of time..." This further supports the idea of the phenomenon understudy of instructional time.

As suggested in Miles *et al.* (2014) the different codes were clustered based on coding frequencies (Adu, 2017) and association into different categories.

Adu (2017) suggested adopting the following steps to logically move from codes to themes:

- Analyse codes and take two codes with highest frequency and sources,
- Group the codes into clusters depending on relationships or association;
- Fit in the remainder of the codes into different categories
- If there are orphan codes create another separate cluster
- Look for the appropriate label befitting the data
- Sum the codes

At the beginning of analysis, the researcher followed inductive approach to avoid forcing codes. Admittedly as Miles *et al.* (2014) mention, one of the challenges of inductive approach is that every concept looks very important. However, the researcher remained guided by the research questions and came up with the codes shown in Table 5.12.

## **5.12 Summary of Themes from Qualitative data**

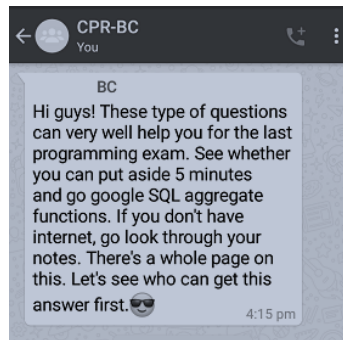
Table 5.12 provides a summary of themes from lecturer interview data.

**Table 5. 12: Summary of themes from Phase 1**

<b>Theme</b>	<b>Categories</b>	<b>Codes</b>
<b>Awareness of instructional time loss</b>	<i>Learning efficiency contributors</i>	Infrastructure Attendance Issues Cognitive differences Insufficient time Meeting Inconsistency in recording
	<i>College Interventions</i>	Informal ways Extra class No plan
<b>Need for Framework</b>	<i>Integrated MSN Framework</i>	Standardisation of platforms Support for MSN
	<i>Fears OR Excitement</i>	Privacy concerns Bullying Chaos Activation of muted voices
<b>Preferred Contact Style</b>	<i>Contact style</i>	Projection Confluence Retroreflection
<b>NCV Challenges</b>		Curriculum Issues Gender Imbalance Lack of infrastructural support
<b>MSN Non-usage factors</b>		Lecturer Negativity Social Loafing Doubt in efficiency of MSN

### 5.13 Reflect stage of Phase 1

Following Kemmis and McTaggart’s (2005) stages of PAR, knowledge is built through sharing of experiences which can be achieved after several iterations. The last stage of each phase involves reflection(s) which can be refined and fed into the next phase as inputs or kept to see if the same results can occur again. During Phase 1, the researcher observed that there was an issue of lecturer negativity. This was observed from the reduced posting to the WhatsApp groups. At one campus (BC) the lecturer saw WhatsApp as a competing threat to the Moodle platform which he was tasked to spearhead their college, until the researcher had to re-explain his position, then the lecturer started encouraging his learners (see Figure 5.9). LSC01 kept citing privacy issues and saying that he needed to buy a separate line for the group. What was clear was that all five lecturers acknowledged that the concept of instructional time loss was a reality. As from the learners’ side, the researcher observed that the groups were synonymous with ‘social loafers’ who only wanted to benefit from other learner contributions. He could concur with what LBC1FV said on WhatsApp as reflected on the screenshot shown below:



**Figure 5. 9: Extract from LBC1FV**

Detailed extracts from each WhatsApp group have been attached (see Appendix 12A-12E). The extracts show the type of conversation and participation by learners mostly.

### **5.14 Action for Phase 1**

It was important to start with interviewing the lecturers since they were the gatekeepers of instructional time at class level. The results were used to inform the learners in their Phase 2 on the amount of time needed for the subject and creating awareness on instructional time. Lecturers were requested to highlight the issue of instructional time to the learners and its associated potential impact. Phase 2 reports on findings collected using questionnaire from learners. In addition, test scores and attendance were also analysed.

### **5.15 Participatory Action Research Phase 2**

#### **5.15.1 Plan for PAR2**

Phase 1 reflections were used to guide modification of interventions in Phase 2. Evidence collected from attendance registers and timetables in Phase 1 was convincing that instructional time loss existed within the TVET sector. Discussions with the lecturers indicated their enthusiasm to collaborate with learners on WhatsApp group. Learners were excited to take part in phase 2 of the project, with not a single one leaving the groups after Phase 1. Discussions on WhatsApp indicated that colleges were not moving with the syllabus at the same pace and discussions needed to be customised per group. Phase 2 involved analysing attendance, test marks and questionnaires distributed to learners who had agreed to take part in the study. From possible total of 89 participants, there was a response rate of 82.02 % (N=73).

### 5.15.2 Act and Observe phase

Conversations with learners on WhatsApp continued with learners. Lecturers were encouraged to participate more to increase learner confidence in the groups and perhaps improve participation by all learners. Section 5.16 presents results on Term 2 attendance.

### 5.16 Analysis of Term 2 attendance

Table 5.13 shows the number of periods which were designated for the Computer Programming at each college in Term 2. The most surprising data was that of BC and SC where the number of periods were far less by 14 and 12 periods respectively than what they were supposed to have, had they followed the DHET calendar (see row 6 column 4). After checking with the lecturers, the researcher was informed lecturer LSC01 was away sick for almost two weeks and learners were not penalised for the purposes of accessing transport allowances which they receive as part of the bursary. The same happened at BC College where LBC1FV had to attend meetings and training during class time resulting in instructional time loss. However, for the purposes of the present study, the total number of days when the lecturer was either away sick or attending training were reported as instructional time lost. As illustrated in the last column of Table 5.13, BC and SC had significant lessons missed (n=14 and n=12 respectively) in Term 2 but still not recorded as lost time.

**Table 5.13: Comparative analysis of number of periods allocated for Computer Programming**

Name of College	College actual periods	DHET Calendar periods	Periods short
CC	61	61	0
FB1	63	63	0
FB2	54	55	1
BC	40	54	14
SC	42	54	12

In comparison to Term 1 (see Table 5.5), Table 5.13 reflects that CC had improved significantly with all periods accounted for. FB1's attendance was consistent as in Term 1.

### 5.17 Analysis of Term 2 marks

It will be noted that Theory test 2 was executed before the introduction of WhatsApp intervention. However, the researcher reported the results in order to check for a possible consistent connection between attendance and performance in Phase 2.

### 5.17.1 Comparative analysis of Theory Test 2

Table 5.14 provides comparative descriptive statistics for the Theory Test 2 scores from the five colleges. The data in row 2 suggests that urban TVET colleges (CC, FB1 & FB2) appeared to have performed better in the Theory Test 2 as reflected by a higher mean (CC:  $Mdn=68.00$ ; FB1:  $Mdn=74.00$ , FB2:  $Mdn=62.00$ ) compared to the two rural colleges (BC:  $Mdn=61.50$ , and SC:  $Mdn=37.50$ ). The data from Table 5.14 was negatively skewed (see row 6).

**Table 5. 14: Summary statistics for Theory Test 2**

	Colleges				
	CC	FB1	FB2	BC	SC
Number of learners	19	20	28	12	10
Mean	66.32	71.20	60.39	58.75	40.20
Median	<b>68.00</b>	<b>74.00</b>	<b>62.00</b>	<b>61.50</b>	<b>37.50</b>
Std. Deviation	11.60	14.63	8.75	12.05	13.56
Skewness	<b>.014</b>	<b>-.423</b>	<b>-.410</b>	<b>-.347</b>	<b>.645</b>
Inter-Quartile Range (IQR)	<b>19</b>	<b>22</b>	<b>13.5</b>	<b>19.25</b>	<b>16.75</b>

As mentioned earlier, *SD* has limitations as measure of variation for skewed data, hence boxplots are presented in Figure 5.10.

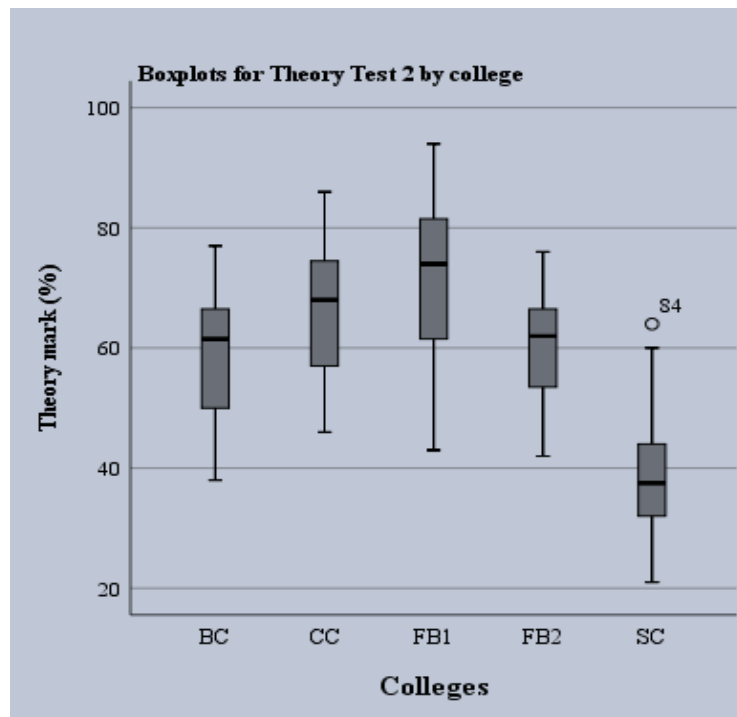


Figure 5. 10: Boxplots to show Theory Test 2 results for the five colleges

As reflected in Figure 5.10, FB2 had the most densely spread (IQR=13.5) data, suggesting that Theory test 2 scores were consistently around the centre values than the rest of the data sets

presented. SC College was the lowest performer as shown by the lower whisker and median. In summary, it can be suggested that the three colleges (CC, FB1 and FB2) had an increased number of days attended in comparison to SC and BC; perhaps also explains why the performance in Theory Test 2 was better as reflected by the median.

### 5.17.2 Comparative analysis of Practical Test 2

Marks for Practical Test 2 were combined for a general view of the scores for the purposes of reflecting programming skills. In general, the test scores suggest a fairly high centre of tendency (*Mdn*=68%). Figure 5.11 shows a general overview of variation with two weak outliers, and long whiskers and longer box suggesting that data was weakly spread around the median.

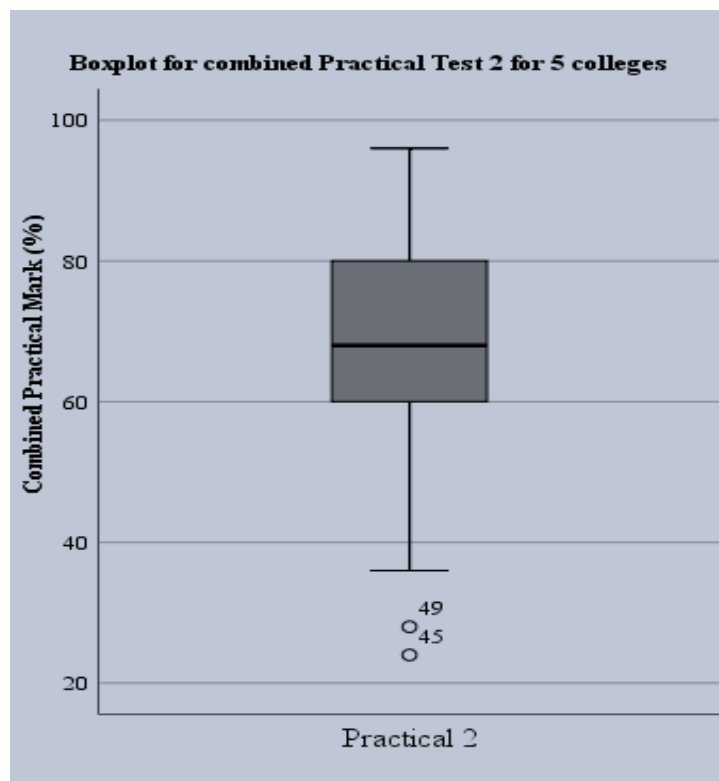


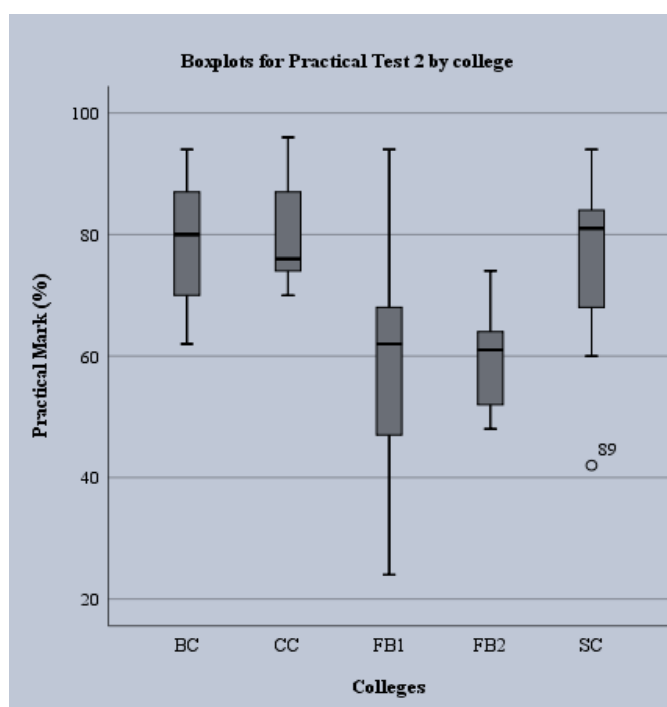
Figure 5. 11: Box pot for combined practical test

A detailed analysis of test scores per college is presented in Table 5.15. An interesting reflection from Table 5.15 reflected lower median for urban TVET colleges (see row 5) (CC: *Mdn*=76, FB1: *Mdn*=62, FB2: *Mdn*=61) in comparison to the rural TVET colleges (BC: *Mdn*=80, SC: *Mdn*=81). The distribution for the two rural colleges indicated a left skew while the distribution for the urban colleges was right skewed. Further analysis using boxplot to check for outliers is presented in Figure 5.12.

**Table 5. 15: Comparison of statistics for Practical Test 2 per college**

	Colleges				
	CC	FB1	FB2	BC	SC
Number of learners	19	20	28	12	10
Mean	80,42	59,60	59,21	79,33	75,40
Median	<b>76.00</b>	<b>62.00</b>	<b>61.00</b>	<b>80.00</b>	<b>81.00</b>
Std. Deviation	8.13	19.77	7.53	10.14	15.20
Skewness	.702	.062	.092	-.208	-1.266
Interquartile range	14	23.50	12	19.50	18.00

As reflected in Figure 5.12, FB2 had the most densely spread data suggesting that test scores were consistently around the centre values than the rest of the data sets presented. However, more scores were spread in the second quartile. SC College had one weak outlier where the score (42%) was outside the lower whisker. From the boxplots, it is also apparent that the highest performers for practical test 2 were from FB1, BC and SC with the lowest performer also from FB1, as indicated by lower whisker.



**Figure 5. 12: Boxplots to show Practical Test 2 results for the five colleges**

In summary, comparing data in Table 5.14 and Table 15, it can be suggested learners performed better for practical test than Theory test 2 even at SC and BC were number of days missed in Term 2 was more than the other colleges.

### 5.17.3 Comparative analysis of Combined ISAT

To assess overall performance for skill, descriptive statistics were used as reflected in Table 5.16.

ISAT Summary statistics	
Number of learners	89
Mean	68.00
Median	72.00
Std. Deviation	20.790
Skewness	-1.952
Maximum	94
Interquartile Range	20.00

As shown in the table, the data was negatively skewed (skew = -1.952, mean = 68% and *Mdn* = 72%) and as such could not rely on standard deviation for variation of results. Instead boxplot was used as in Figure 5.13.

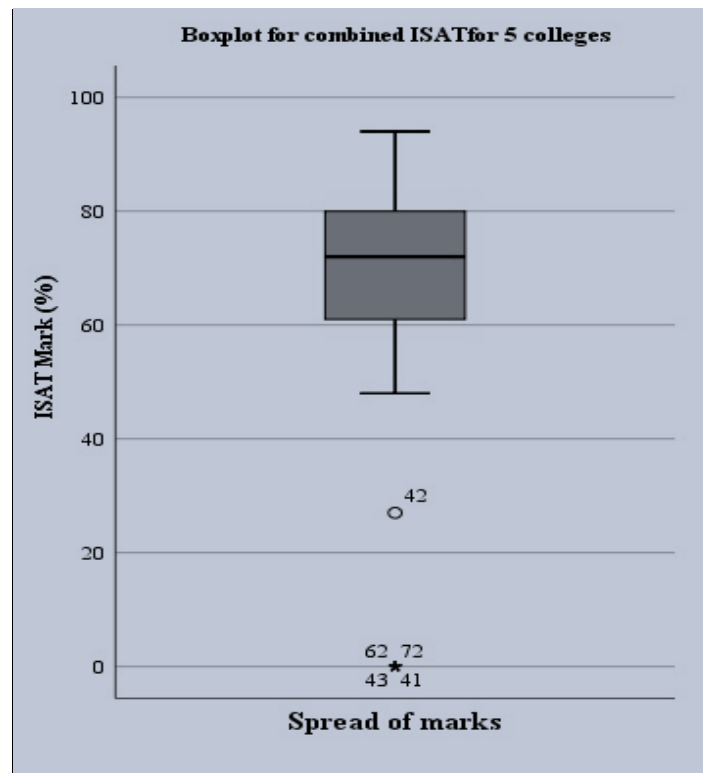


Figure 5. 13: Combined ISAT Mark

The boxplot above indicates a comparatively denser variation. However, there was more data in the lower 50% of the boxplot compared to that of the upper 50% of the box. Although the upper whisker seems relatively longer than the lower whisker, suggesting right skew, there were four extreme outliers below the lower whisker as reflected by an asterisk on the boxplot where

learners got very low mark (n=0%), making the data left-skewed. Presumably, the four learners (2 from FB2 and 2 from FB1) did not hand in their ISAT project. However, out of 89 learners, very few learners (n=8) achieved marks below 50%, suggesting a good level in skills.

Moving on to cross-case analysis, descriptive statistics were extracted from SPSS with IQR added and these are shown in Table 5.17. As shown on the table, FB2 and BC had a lower median (67% and 70% respectively —see row 5). Standard deviation shown in row 7 best depicts variation for CC College as very compact (SD=6.199%) distribution. Hence, interquartile range is used (see row 11) for the rest of the colleges in explaining the boxplots though it accounts for 50% of the distribution for variation of scores.

**Table 5. 17: Descriptive statistics for ISAT mark for each college**

	Colleges				
	FB1	FB2	CC	SC	BC
Number of learners	20	28	19	10	12
Mean	61.50	60.75	82.26	74.4	67.83
Median	74.50	67.00	80.00	75.5	70.00
Std. Deviation	31.375	18.731	6.199	10.721	11.839
Skewness	-1.120	-2.598	-.166	-.230	-.410
Inter-quartile range	34.25	11.75	11.00	12	16.25

ISAT scores were then reflected per college using boxplots as presented in Figure 5.14. CC had the least variation (as depicted by length of the box) with the lowest interquartile range of 11%, making the figures from the college more dependable in reporting skill. Most of the marks for CC learners were spread above the median (82.26%), a fairly high mark compared to the rest of the colleges, as shown in Figure 5.36 below. While interquartile range shown in Table 5.17 suggests a very large variation for FB1, it can be noted that there were two outliers with very low scores each (0%). FB2 had only two extreme outliers reflected with an asterisk while SC had one weak outlier. Data for all colleges was left-skewed. The data shown on the boxplots suggest that CC consistently performed better in ISAT, a descriptor used in this study to evaluate skills required for the subject. Overall, the five batches of ISAT scores suggest varying distribution in ISAT performance altogether but most of it above the 50% pass mark for the ISAT.

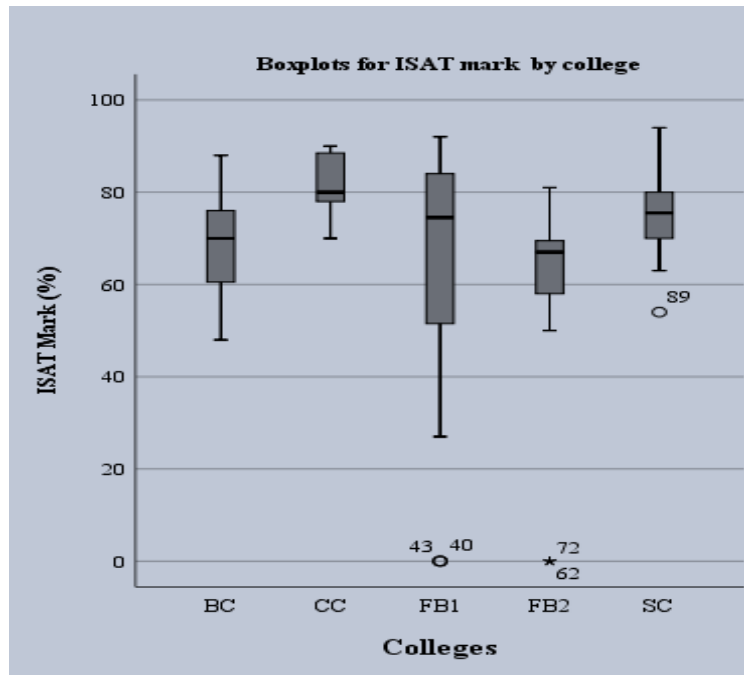


Figure 5. 14: Boxplots to show ISAT results for the five colleges

#### 5.17.4 Analysing association between attendance and Test 2 marks

Association results were presented for Theory test and Practical Test 2 only excluding ISAT because ISAT is a year project but execution is only done in the beginning of Phase 2. Spearman's correlation results ( $r_s [89] = .423, p (2\text{-tailed})=0.00$ ) between attendance and theory test 2 mark for all learners combined reflected a positive moderate association. The association was significant at a 10% level of significance (that is to say,  $p < 0.01$ ). For the Practical Test 2 and attendance, results ( $r_s [89] = .134, p (2\text{-tailed})=.210$ ) reflected a very weak positive association and would not be considered as statistically significant as the p value is greater than 0.01.

As reflected in Table 5.18, a comparative analysis of correlation statistics was also carried out for individual colleges. BC results for theory test 2 ( $r_s [12] = .651, p (2\text{-tailed})=.022$ ) indicated a moderate positive association and considered statistically significant (that is to say,  $p < 0.05$ ) while there was ( $r_s [12]= .416, p (2\text{-tailed}) = .178$ ) positive moderate but not considered statistically significant for the Practical Test 2. The same test reflected a moderate negative association for both theory test 2 and practical test 2 scores and not considered statistically significant for SC College also classified as rural TVET. Moving on to the other three colleges classified as urban only CC Practical Test results ( $r_s [19] = .494, p (2\text{-tailed})=.032$ ) indicated a moderate positive association and statistically significant (that is to say,  $p < 0.05$ ). The rest of

scores for CC (theory), FB1 and FB2 (both theory and practical) reflected a positive association but not of statistical significance.

**Table 5. 18: Comparative correlation analysis between attendance and Test 2 scores for 5 colleges**

	BC (n=12)		SC (n=10)		CC (n=19)		FB1(n=20)		FB2 (n=28)	
	Test	Practical	Test	Practical	Test	Practical	Test	Practical	Test	Practical
Number of periods attended	.651*	.416	-.610	-.244	.213	.494*	.111	.346	.102	.227
<b>p value</b>	.022	.178	.061	.497	.381	.032	.641	.136	.604	.246

Note: \*Correlation significant at 0.05 level

In summary, results on statistical significance between performance (Theory Test 2 and Practical Test 2) and attendance in Term 2 suggested mixed results. However, ISAT results were encouraging at the five locations. Section 5.18, therefore, moves on to present results from the learner questionnaire.

## 5.18 Analysis of questionnaire responses for PAR Phase 2

Questionnaire data was collected using Qualtrics software because it offers comprehensive analysis and reporting of results for closed-ended questions. The researcher decided to distribute the questionnaire through a link<sup>7</sup> which he availed to the learners, and the questionnaire was completed during their Computer Programming period where they had access to internet. Although hardcopies were also given to the learners, all participants completed the questionnaire using the web link provided. Out of a possible of 85 learners, 73 (86%) completed the questionnaire in full and these were analysed.

### 5.18.1 Biographical data of questionnaire respondents at BC College

Figure 5.15 shows the composition of participants of BC College. Out of a total of 7 participants who completed the questionnaire, 1 was female and 6 were male. Most of the participants (n=6) from BC college were within the 21 to 25 years' age group. None of the respondents were within the 30 years and above age group. Response IDs used were BC1 to BC7 for the purposes of anonymity.

<sup>7</sup> [https://ucpcommerce.eu.qualtrics.com/jfe/form/SV\\_dirw46aifDLMsF7](https://ucpcommerce.eu.qualtrics.com/jfe/form/SV_dirw46aifDLMsF7)

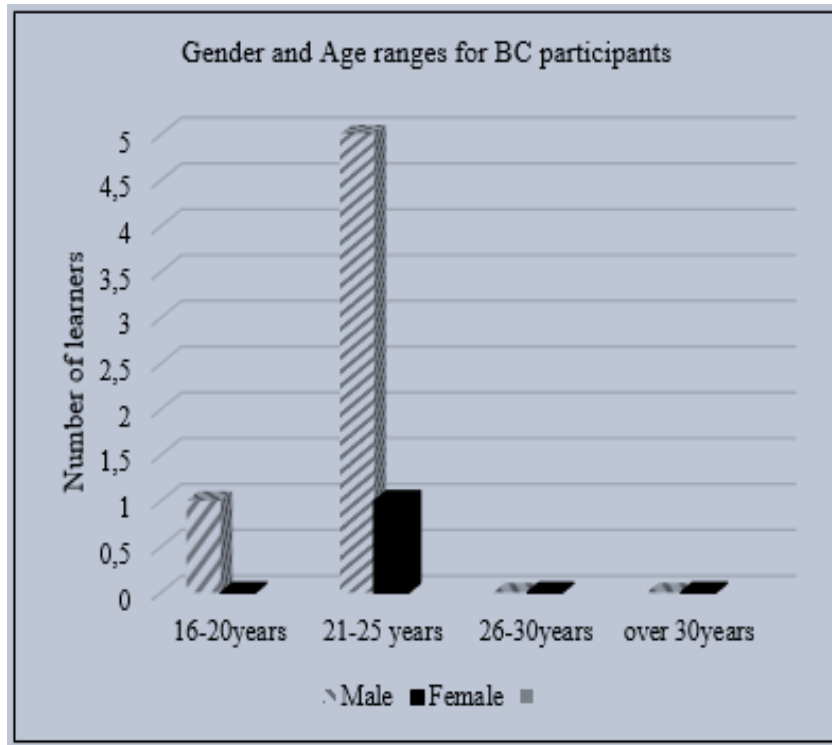


Figure 5. 15: Questionnaire Participant composition (BC College)

As can be seen in Figure 5.15, the results suggest gender imbalances, with very few female participants (n=1).

### 5.18.2 Biographical data of questionnaire respondents at CC College

Figure 5.16 shows the composition of 17 participants of CC College. Response IDs from CC1 to CC17 were used throughout for the purposes of anonymising the participants. Out of a total of 17 participants who completed the questionnaire from CC College, most were in the 21-25 age range with 7 being male and 4 females. Ages ranged from 16 -20 had the second highest composition with 3 males and 1 female. The 26-30 range and 30years+ range groups had 1 female each and no males. However, the results show that the number of males (n= 10) to females (n=7) was almost equal compared to BC, SC and FB1.

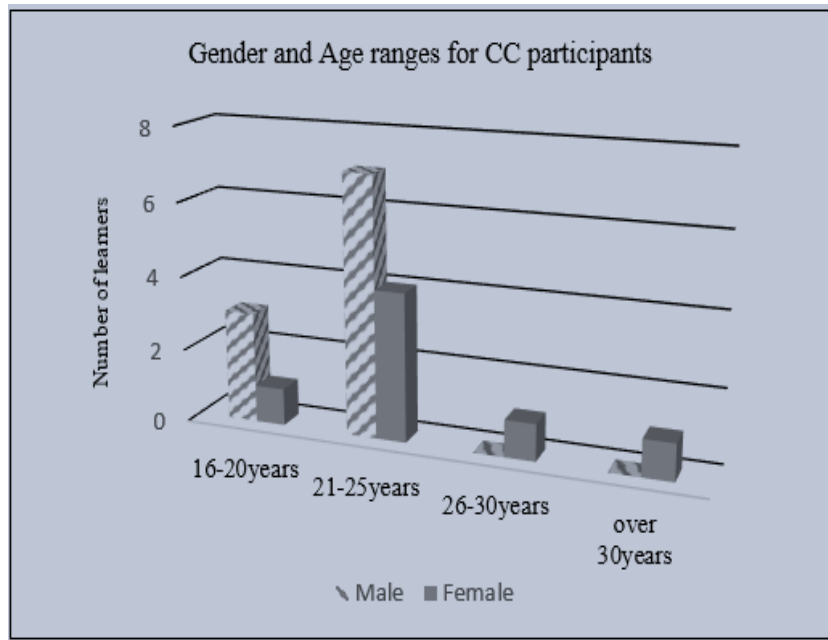


Figure 5. 16: Questionnaire Participant composition (CC College)

### 5.18.3 Biographical data of questionnaire respondents at FB1 College

A significant reflection from the results revealed that NCV IT at FB1 is predominantly male-dominated just as at BC. Out of the 15 learners from FB1 who completed the questionnaire, 14 were male (n=93.33%) and only 1 female (n=6.67%). Figure 5.17 presents the composition of the 16 participants from FB1 College who completed the questionnaire. Response IDs from FB1-1 to FB1-16 are used in this report for the purposes of anonymity, excluding FB1-7 whose responses were incomplete and excluded from the analysis to avoid skewing data. Similar to other colleges, most of the participants (n=8) were found to be within the 21-25 age group. The 26-30 range and 30 years+ range groups had 1 male each and no females.

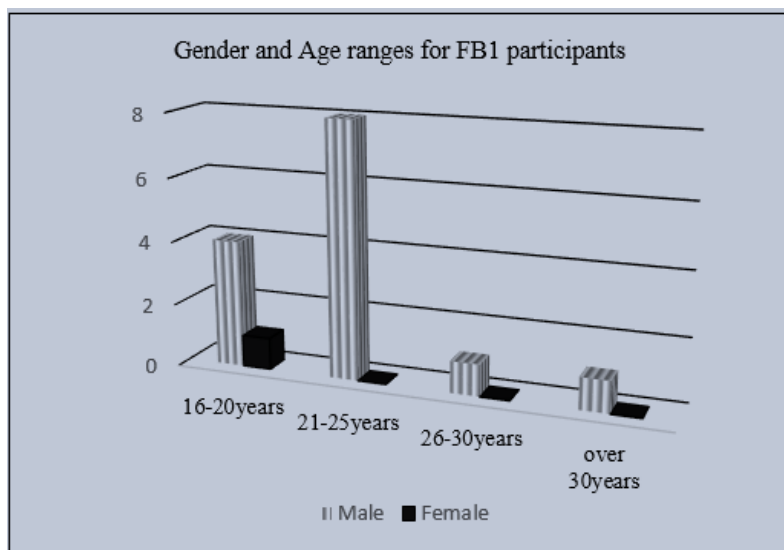


Figure 5. 17: Questionnaire participant composition (FB1 College)

#### 5.18.4 Biographical data of questionnaire respondents at FB2 College

Of the 24 participants who completed the questionnaire from FB2 College, most were female (n=11) in the age group of 21-25 with approximately one-third (n=8) of the participants being male (see Figure 5.18). The age group of 26-30 consisted of equally a smaller number (n=2) of males and females. There was only 1 male participant in the age range of 30+ years and no females. These results revealed a high number (n=14) of female learners in total compared to that of the sister campus FB1 which had only 1 female participant. Figure 5.16 shows the demographic composition of 24 participants from FB1 College who completed the questionnaire.

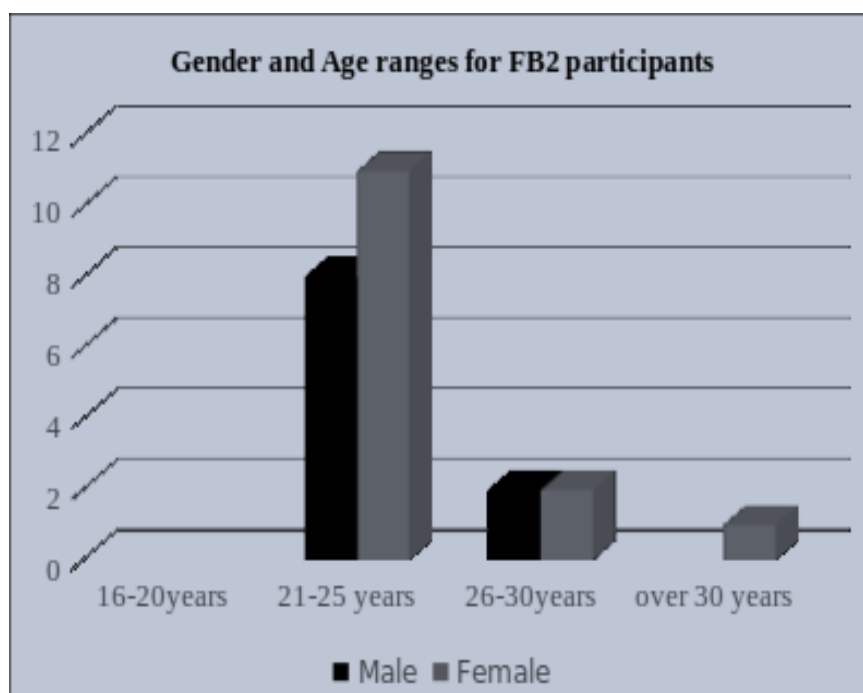


Figure 5. 18: Questionnaire Participant composition (FB2 College)

#### 5.18.5 Biographical data of questionnaire respondents at SC College

Figure 5.19 shows gender distribution for participants who attended SC College. Of the 10 participants, half were males (n=5) within the 21-25 age group. There were no participants within the 30 and above age group.

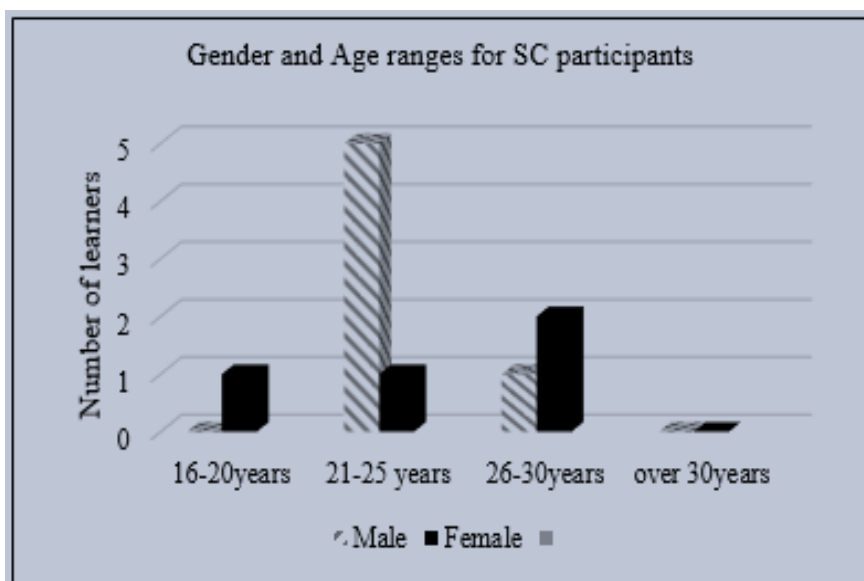


Figure 5. 19: Questionnaire Participant composition (SC College)

### 5.18.6 Overall demographics summary

The age ranges of the respondents are reflected on Table 5.19. Data from the 73 completed questionnaire respondents showed that most of them fell in the age group of 21-25 (n=50). The age group of 16-20 had the second highest number of respondents (n=11). Just above 12% (n=9) of the participants' ages ranged from 25-30, while very few respondents (n=3) were above 30 years old. All the respondents opted to disclose their age groups.

Age group	Count	%*
16-20 years	11	15,07
21-25 years	50	68,49
26-30 years	9	12,33
>30years	3	4,11
Prefer not to say	0	0,00
<b>Total</b>	<b>73</b>	<b>100</b>

\* Correct to 2 decimal places

Further analysis on age groups and gender generated through a cross-tab functionality in Qualtrics (see Table 5.20 row 2) reflected that most of the respondents from the questionnaire were male (n=46) with the remainder (n=27) being female. Majority of the learners (n=50) were found to be in the 21 to 25 age group suggesting that a number of learners who proceed to NCV level 4 must have started attending the course after completing Grade 12, or else stayed out of school after Grade 9, 10 or 11. On the other hand, very few learners were found to be in the age group of 30 years and above. There is a possibility that people above 30 years of age rarely progress to NCV level 4 or NCV as a programme does not attract people who are in that age

group. Another possible assumption could be that aged potential NCV candidates may be shy to be in the same class with those candidates who just finished Grade 9 in the previous year.

**Table 5. 20: Age group and gender data**

		Age groups				Prefer not to say	Total	%
		16-20 years	21-25 years	26-30 years	>30years			
<b>Gender</b>	<b>Male</b>	8	33	4	1	0	46	63,01
	<b>Female</b>	3	17	5	2	0	27	36,99
	<b>Other</b>	0	0	0	0	0	0	0,00
	<b>Prefer not to answer</b>	0	0	0	0	0	0	0,00
<b>Total</b>		11	50	9	3	0	73	100

When the participants were asked where they lived, the majority (n=51) of the respondents from two urban TVET colleges (FB (FB1 & FB2) and CC College) in the Western Cape said they were from suburbs like Khayelitsha, Manenberg, Mitchells Plain, Nyanga, Lavender Hill and others which are well-known for crime, gangsters and drug-related issues. Only 6 learners indicated that they were staying in areas presumably regarded as slightly more safe with fewer social challenges. Of the remaining 17 respondents attending rural colleges (BC & SC College), a fairly large number indicated to be staying in areas which are slightly less known for crime, gangsters and other social issues like Strand, Somerset, Mossel Bay, Stellenbosch and others surrounding suburbs. Interestingly, on demographic composition, results reflected that female participation in predominantly male vocations is high, particularly in areas associated with economic challenges, as evidenced by the number of female learners attending CC and FB2 Colleges with most of them staying in the townships.

## **5.19 Analysis of closed-ended question**

Closed-ended questions generated quantitative data following responses rated on a 5-point scale from ‘Strongly agree’ to ‘Strongly disagree’.

### **5.19.1 Device ownership**

Out of 73 participants, only a small number (n=7) did not name clearly the type of mobile device they were using for WhatsApp interaction, preferring to just call it “cellphone”. The most popular brands were Samsung, Huawei, Mobicel and Hisense. Only one respondent did not have a mobile phone to use for WhatsApp at the time of the questionnaire. Nonetheless, it is assumed that the respondent had access to the chat messages through a friend’s or relative’s

phone. With a few exceptions stated above, the results show that most NCV IT learners own a smartphone.

**5.19.2 Usage of Mobile Social Network applications**

Of the 73 respondents, 72 responded to question number 8 on experience in using WhatsApp. One of the respondents decided not to complete the question on usage experience. However, the participant participated in WhatsApp group chat, therefore, the researcher did not discard his responses. It was noteworthy that most participants claimed to have expert experience (n=60), while just under 20% (n=12) said they were less experienced (novice). As reflected in Table 5.21, Facebook messenger was the second highest with expert usage experience of 69.70% (n=46) of the 66 respondents to the question. Data reflected that Viber, Telegram and Mixit did not command a large crowd in terms of expert experience. Data presented in Table 5.21 row 3 supports the use of WhatsApp as the MSN application of choice for this study.

**Table 5. 21: MSN usage experience**

		<b>Novice</b>	<b>Expert</b>	<b>Never used it before</b>	<b>Total</b>
<b>MSN Apps</b>	WhatsApp	12	60	0	72
	Telegram	10	5	42	57
	Viber	5	1	51	57
	Facebook Messenger	14	46	6	66
	Mixit	15	30	15	60
	Other(Please specify)	6	10	6	22

To illustrate usage experience according to age groups, the researcher cross-tabulated findings on age group and MSN use. He found that 90% of respondents (n=10) in the age range of 16-20 years indicated expertise in use of WhatsApp. For those in the category of 21-25 years old, 84.3% highlighted expertise in use of WhatsApp. Respondents above 30 years old indicated a further drop in expertise. A striking finding to emerge from the data was that proficiency in WhatsApp appears to drop as age increases. Further to the analysis, none of the respondents had never used WhatsApp before. Moving on to Facebook messenger findings, the percentage of expertise within the 16-20 age group is lower than that of 21-25 age group contrary to the findings on WhatsApp. The findings discussed in the current section can be used to strengthen the argument that WhatsApp is one of the most widely used MSN applications by most learners but also on condition that the methods used to get the figures are taken into consideration.

### 5.19.3 Access to Wi-Fi at the college

In response to question 10 from the questionnaire, 73 participants answered the question with 41.10% (n=30) indicating that they use Wi-Fi during college time while 58.90% (n=43) claimed to use their own data bundles. Figure 5.20 illustrates how participants responded to the question on access to the internet at the college. Respondents had to show whether they accessed the internet through college Wi-Fi or using their data bundles. Shockingly, FB (both campuses FB1 and FB2) and BC are the only colleges where learners had access to college Wi-Fi. In the researcher's view, the results signify the importance that these colleges placed on mobile learning. It is suspected that since participants had access to Wi-Fi while at the college, they were able to save their own data and use it for communication when at home. If the preceding statement is true, perhaps it explains why learners from FB1 participated more on WhatsApp compared to those at SC. However, less participation from BC on WhatsApp after classes, even though they had access to Wi-Fi during college time, makes it problematic to draw positive conclusions.

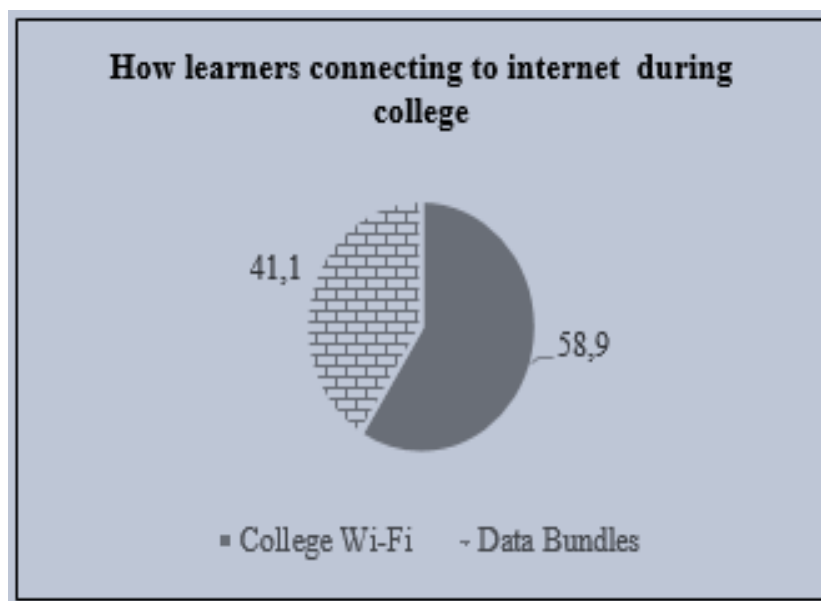


Figure 5. 20: Connectivity access at the college

A similar question on access to internet when learners are at home was asked. Of the 73 respondents, most of the participants (n=59) in said that they used data bundles to connect to the internet while at home while the remainder of the participants (n=14) indicated that they had access to Wi-Fi. None of the learners reported using ad hoc connections foe internet purposes.

#### **5.19.4 Instructional time differences: internal factors**

Responses from 73 participants on instructional time differences are shown on Table 5.22. More than half of the respondents (n=49) felt that student late-coming had a great impact on instructional time differences. A small number (n=14) were negative about learners' late-coming contribution to instructional time. A smaller number (n=10) were not sure on the contribution of learners' late-coming on instructional time loss. When the respondents were asked about bunking, most agreed (n=29) on its contribution, but a lesser number (n=8) 'strongly agreed'. The results match the responses from lecturers regarding bunking: they felt that not much is experienced as the learners are more mature and focused as they get to Level 4. Contrary to the researchers' perception, the majority of respondents (n=23 disagreed, n=21 strongly disagreed) were not of the view that lecturer late coming causes a lot of instructional time loss. My observation revealed that lecturers are stationed in the labs and the learners are the ones roaming. Notable positive figures on causes of instructional time loss were alienated to student protest action and poor time-tabling. Almost a quarter (n=17) of the respondents strongly agreed to student protest action contribution to instructional time loss. This result reinforces what we observed in the year 2015 and 2016 at most TVET institutions and some universities in South Africa following the FEES MUST FALL campaign. The researcher's observation further indicated that CC College experiences student demonstrations almost each term, as reflected on the registers collected.

A noteworthy finding which emerged from the data showed that respondents felt poor time-tabling to be a major cause of instructional time loss. Most of the respondents (n=53) were positive about the impact that poor time-tabling has instructional time loss. The results on time-tabling have been confirmed with what the researcher observed on the timetables collected from the TVET colleges. He observed that at one college, learners had one period of Computer Programming while at other colleges there were double periods allocated for practical sessions. Of the total respondents (n=73), very few participants (n=10) were negative on the impact of time-tabling on instructional time loss. The responds for this question further highlighted that learners need more time for Computer Programming. As reflected in Table 5.22, learners struggling to understand (row 5) and time-tabling (row 10) were the leading suggested causes of instructional time loss internally.

**Table 5. 22: Differences in instructional time (Internal Factors)**

Internal factors	Learners responses (n)					
	Strongly agree	Agree	Not Sure	Disagree	Strongly disagree	Total
a) Learners' late-coming	20	29	10	11	3	73
b) Bunking	8	29	13	18	5	73
c) Learners struggling to understand subject	27	28	13	4	1	73
d) Lecturers' late-coming	2	10	17	23	21	73
e) Learner indiscipline	6	15	20	22	10	73
f) Staff meetings	4	13	27	22	7	73
g) Learner protest action e.g. fees must fall	17	17	10	14	15	73
h) Poor time-table allocation e.g. less time for lab use	34	19	10	7	3	73

The evidence collected assist in answering sub-question 1: *What are the key factors contributing to differences in instructional time.*

#### 5.19.5 Instructional time loss: External factors

Table 5.23 shows participant responses on external factors believed to be causing instructional time loss within the TVET sector. Close to 70% of the 73 respondents (n=49) were positive that service delivery protests contributed to instructional time loss with just over ten percent (n=8) negative on the contribution. There was a fairly big group of respondents (n=16) who decided to stay on the middle regarding service delivery protest on instructional time loss. As reflected by the response to where most of the respondents stay, these figures strengthen the argument posed by Abadzi (2009) that areas of economically disadvantaged areas are more likely to suffer instructional time disruption due to factors like community protest. Over 50% of the learners (n=40) strongly agreed that taxi violence contributed to instructional time loss. Very few participants (n=4) were negative on how taxi violence affected instructional time. On the issue of train disruption, majority of learners (n=63) were positive about the resulting instructional time loss. Surprisingly, very few respondents (n=20) revealed that staff meetings affected instructional time loss. Instead more than a quarter (n=20) disagreed that staff meetings affected instructional time with under 6% (n=4) strongly disagreeing to the same aspect. Overall, learners felt that transport issues impacted on instructional time.

**Table 5. 23: External factors contributing to instructional time loss**

	<b>Strongly agree</b>	<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Strongly disagree</b>	<b>Total</b>
a) Service delivery protest	24	25	16	4	4	73
b) Taxi violence	40	26	3	2	2	73
c) Train disruptions	43	20	4	1	5	73
d) No bus fare	26	19	22	4	2	73
e) Differences in time allocations	11	21	33	8	0	73
f) Staff meetings	8	12	29	20	4	73

### 5.19.6 Approximation of instructional time lost

Participants were asked to report on whether internal or external factors caused more instructional loss and responses are shown in Table 5.24. All the respondents (n=73) responded to both questions on internal and external factors. Close to half of the respondents (n=36) indicated that little time loss of between 1 to 15 minutes was mainly due to internal factors. Just below 18% (n=13) of the participants indicated that time loss of above 60 minutes could be related to internal factors. In response to external factors, more than a quarter of respondents (n=21) revealed that time loss of more than 60 minutes was due to external factors. These figures reinforce the idea that external factors end up causing absenteeism since issues like train delays, taxi violence and service delivery protest may go on for hours or even days.

**Table 5. 24: Approximation of lost time per week**

	<b>Approximate Time lost</b>					<b>Total</b>
	<b>1-15 minutes</b>	<b>16-30 minutes</b>	<b>31-45 minutes</b>	<b>45-60 minutes</b>	<b>over 60 minutes</b>	
Due to internal factors	36	11	8	5	13	73
Due to external factors	19	14	15	4	21	73

The results corroborate the claim of the study that a lot of instructional time is lost and needs to be extended which justifies the main research question (see 1.2). In addition, results of Phase 1 from the class registers also supports the same notion.

### 5.19.7 Reasons for participation on WhatsApp

Responses to question number 15 from the questionnaire analysed in this section address the research question by answering sub-question number 3 stated as: ***How can MSN be used to increase Instructional Time?*** Statistics on reasons for participation on WhatsApp group discussions are shown in Table 5.25 of the total (n=73) respondents. In response to recovering lost time, most of the respondents (n=28) strongly agreed that their participation was to recover

lost time while an equal number (n=28) agreed to the same reason. Interestingly, none of the respondents strongly disagreed to using WhatsApp for recovering lost time. These results strengthen the belief that a lot of time is lost but never recovered, which in the context of the current research is suspected to result in learning efficiency issues. In addition, the class registers analysed in Phase 1 revealed that colleges were also losing time but records did not indicate where the time was recovered.

Moving on to sharing ideas with classmates, over 50% (n=41) of the respondents strongly agreed to that effect. Again, another striking observation from the responses is the fact that none of them opposed the reason with only a few (n=7) who were not sure of the reason. However, looking at the WhatsApp chat discussions, the researcher observed that there were some muted voices. It is very likely that some subjects might have acted as 'social loafers' or 'free riders' (Kerr & Bruun, 1983; Kreijns et al., 2003). More than half of the learners (n=39) strongly agreed, suggesting that the reason for their participation was asking important information missed during class. Interestingly from the first two reasons, those who were not sure on whether asking important information was a big contributor to their participation on WhatsApp dropped significantly to just above 5% (n=4). Gaining more knowledge attracted more positive responses as well (n=67: 33 strongly agreed, 34 agreed). These responses concur well with literature (Winterton *et al.*, 2005; Downes, 2007; Goldie, 2016) that knowledge is *socially constructed*. The researcher believes that WhatsApp offers *diversity of opinions* through *collaboration*. A small number supported the reason that it was the only time when they could be heard by their fellow learners. More than a quarter of the learners (n=22) agreed that their reason to participate was to improve interpersonal skills. However, these results are mixed having almost an equal number (n=20) of participants who disagreed to using WhatsApp to gain interpersonal skills.

**Table 5. 25: Reasons for participation on WhatsApp**

<b>Internal factors</b>	<b>Strongly agree</b>	<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Strongly disagree</b>	<b>Total</b>
a) To recover lost time	28	28	11	6	0	73
b) To share ideas with my classmates pertaining to the subject	41	25	7	0	0	73
c) To ask important information missed in class	39	30	4	0	0	73
d) To be constantly in touch with my lecturer for homework purposes	20	29	15	9	0	73
e) To gain more knowledge on the subject	33	34	3	3	0	73
f)It's the only time I can be heard by my friends	4	5	21	27	16	73
g) Just for fun	4	7	5	27	30	73
h) To improve my interpersonal skills e.g. communication	12	22	15	20	4	73
i) Just to know what other learners think about the subject	8	23	18	20	4	73

### **5.19.8 Challenges encountered during the discussions**

Table 5.26 provides responses to question 16, which highlighted the challenges that participants faced when using WhatsApp for group discussions. Part of the responses guide the study in formulating prescriptions for increasing instructional time using WhatsApp. Over half (n=38) of the participants strongly agreed to having insufficient data during the discussion, as one of the challenges which they faced during WhatsApp discussions. As anticipated in the proposed conceptual framework in Chapter Six, data availability due to cost is still a challenge which can affect the success of MSN initiatives. Very few respondents (n=7) strongly agreed to use of mother language as a challenge in their participation on WhatsApp. Instead majority of respondents (n=32) disagreed that use of mother language affected their participation. With regards to screen size, just above 70% of the learners (n=52) did not see it a challenge during WhatsApp discussions probably because majority of smartphones are now designed with bigger screen display. Despite the FRAME model (Koole, 2009) listing battery span as another challenge which may affect mobile learning, responses from the current study were weak to confirm with certainty with almost an equal number (n =32) of participants positive and while on the other hand, almost the same number (n= 35) were negative regarding the factor. It is suspected that since WhatsApp discussions were done after classes, most of the participants would be home by then and would connect to the charger if need be. Very few learners (n=15)

felt that posting messages the whole day was a challenge during the WhatsApp discussion. The results also revealed that few (n=10; 4 strongly agree and 6 agree) learners felt intimidated by lecturer presents.

**Table 5. 26: Challenges faced during communication on WhatsApp**

	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	Total
a) Not enough data bundles	38	18	7	6	4	73
b) Some learners use their mother language instead of English	7	15	6	32	13	73
c) Screen size of my phone limited me	5	7	9	37	15	73
d) My battery often went flat	13	19	6	29	6	73
e) Some learners post messages whole day and night	6	9	14	30	14	73
f) Lecturer presence intimidated me to participate without fear	4	6	24	25	14	73
g) Some learners are listened to more than others	9	9	9	29	17	73

Results presented in this section suggests that perhaps device issues are not much prevalent in comparison to data availability.

### 5.19.9 Contact style on WhatsApp groups

Table 5.27 shows the 73 responses for each instructional contact style and seeks to answer research sub question number 2: *How does the different Instructional contact style affect learning efficiency?* More than 50% of the participants (n=55) were positive on the fact that the contact style adopted helped them to understand their learning outcomes with only less than 7% (n=5) disagreeing and none strongly disagreeing. When asked whether the contact style adopted helped them to have control of the learning outcomes more than half (n=50) of the respondents were positive while only just above 4% (n=3) disagreed. It is the researcher's belief that those who were not sure (n=20) might have been learners who did not know the learning outcomes. Over half of the respondents (n=38) claimed to prefer to be in the middle when communicating with fellow group members. Assuming that the learners who avoided over-questioning and avoided being too quiet for the purpose of careful analysis and studying of the chat contributions, learning was boosted (Bentley, 2002). A striking observation on deflecting style revealed that more than two-thirds (n=53) of the respondents were in favour of lecturer and researcher presence in the group as this helped the group to have controlled discussions. Statistics of the number of people who left the group (n=1) chat in Phase 1 in all groups did not

support defecting contact style. However, it is also important that there could be participants who stayed in the group out of respect not because they saw value neither enjoyed the discussions. Retroreflection and confluence contact style attracted only just above 41% (n=30) each for those who supported them as valuable contact style which they preferred to be adopted by the lecturer. Overall, the findings were in favour of deflecting contact style since it is the one which allows learners to stay focused if there is a lecturer within the chat groups as advocated in this study.

**Table 5. 27: Contact styles**

	<b>Strongly agree</b>	<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Strongly disagree</b>	<b>Total</b>
a) To understand the subject outcomes	22	33	13	5	0	73
b) Helps learners to have control of their learning outcomes	16	34	20	3	0	73
c) To predict learning outcomes	7	30	29	7	0	73
d) To operate in the middle ground when communicating with others	11	27	29	5	1	73
e) To take ownership of my work through participating frequently	13	34	22	3	1	73
f) To stay focused through the presence of the teacher in the group.	14	39	15	3	2	73
g) to avoid being overaggressive and holding-in to emotions during discussions for continuity.	9	21	30	9	4	73
h) Not to lose sight of myself and my needs but also avoided being isolated.	11	19	26	10	7	73
i) Avoid being oversensitive but instead supportive	15	24	23	7	4	73

#### **5.19.10 Learner perception in WhatsApp usage**

Responses in Table 5.28 reflected what the participants thought when asked on their perception of WhatsApp to increase instructional time. More than three-quarters of the respondents gave a positive feedback in favour of WhatsApp use to increase contact outside college time. Of the 73 subjects who responded to the question, slightly above 2% (n=2) disagreed that WhatsApp can assist in extending contact time. The results were so significant to the fundamental theme of the present study that WhatsApp can potentially be used to extend instructional time. Another notable response which emerged from the data was that almost 70% (n=52) of the respondents

were in favour of the idea that WhatsApp allowed instant feedback. These figures corroborate previous results (Rambe & Bere, 2013; Bere & Rambe, 2016), supporting the idea of immediacy of feedback articulated in previous literature (Spencer & Hiltz, 2003). As expected, others factors which attracted positive support included critical engagement (n=50), getting new tricks of work learnt in class (n=51), free from bureaucratic ranking (n=38), being with support anywhere, anytime (n=66) and leaves no questions unanswered (n=45). However, the results require some degree of caution since there were a significant number of participants who selected the ‘Not sure’ option, weakening other results. Nevertheless, despite a reasonable number of participants who chose the ‘Not sure’ option for each question, the figures of those who supported concurs with what has been found in the literature reviewed for the current study. It is worthwhile mentioning that those participants who were not in favour of choices listed in Table 5.28 (i.e. disagree and strongly disagree) did not surpass any of the choices for those who were in favour of. In summary, the responses from question 19 reinforce the current study proposal that WhatsApp has a potential to address instructional time loss. The results satisfactorily address the research sub-question number 3 stated as: *How can MSN be used to increase Instructional Time?*

**Table 5. 28: Different uses of WhatsApp**

	<b>Strongly agree</b>	<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Strongly disagree</b>	<b>Total</b>
a) Can assist in increasing contact time outside the college	29	36	6	2	0	73
b) Collaboration helped me to get all support needed for the subject	20	30	16	6	1	73
c) Allows instant feedback which is not possible through other platforms	16	35	17	4	1	73
d) Enabled me to participate in critical engagement for Computer Programming	18	32	18	4	1	73
e) Helped me to get some new tricks not learnt in class	19	32	15	5	2	73
f) Participation is free from bureaucratic ranking of speakers	12	26	32	3	0	73
g) Helps to be in touch with support anywhere anytime.	17	49	7	0	0	73
h) Leaves no questions unanswered	14	31	17	10	1	73

### **5.19.11 Learner perception on WhatsApp**

In response to question 21, the majority of the participants (n=59) supported that WhatsApp is useful in dealing with instructional time discourse (See Table 5.29 row 3). This further strengthened responses from question 19 which were open-ended. Another striking response

shown in Table 5.29 row 5 was a positive perception of use by the majority of the participants (n=51) on the basis that WhatsApp offers a variety of ways to convey messages like video, audio, text and others. Notably, there were a sizeable number (n=20) who had a negative perception due to associated costs (see Table 5.29 row 3). The results from question 21 assist to address research sub-question 5 (see Table 1.1). Overall, the responses from the participants revealed a positive perception for the use of WhatsApp beyond the classes.

**Table 5. 29: Participants perception on WhatsApp**

<b>Question</b>	<b>Strongly agree</b>	<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Strongly disagree</b>	<b>Total</b>
a) I believe WhatsApp is useful in dealing with instructional time discourse when learning CP	22	37	12	2	0	73
b) I prefer to learn using WhatsApp than other platforms because it's cheap	12	27	14	18	2	73
c) I prefer to learn using WhatsApp outside class than other platforms because it allows video, voice and text	15	36	14	7	1	73
d) Using WhatsApp status can reveal what is happening to me to my friends and lecturers	13	31	19	10	0	73

Moving to the question regarding skills, communication emerged as the most significant skill which the majority of the learners (n=54) felt that they gained through use of WhatsApp (see Figure 5.21). Although the figures represented a mixture of strongly agree (n=21) and those who agreed (n=30), the figures are convincing in comparison to those who felt that they did not gain communication skills (n=8). In contrast to the researcher's earlier thoughts, the results from respondents when asked whether WhatsApp enabled them to convert untapped knowledge into more meaningful, was not convincing, with the majority (n=31) of participants preferring to select 'Not sure'. Part of the observation revealed that several participants did not have computers at home .as evidenced from the screenshots of coding taken from the paper instead of computer source code. It is highly likely that these participants may have found it difficult to respond with certainty, therefore the most plausible response to them may have been 'Not sure'. More than 50% (n=38) agreed that through socialisation they shared rich and untapped skills through social means with slightly under 20% (n=13) strongly agreeing to the response.

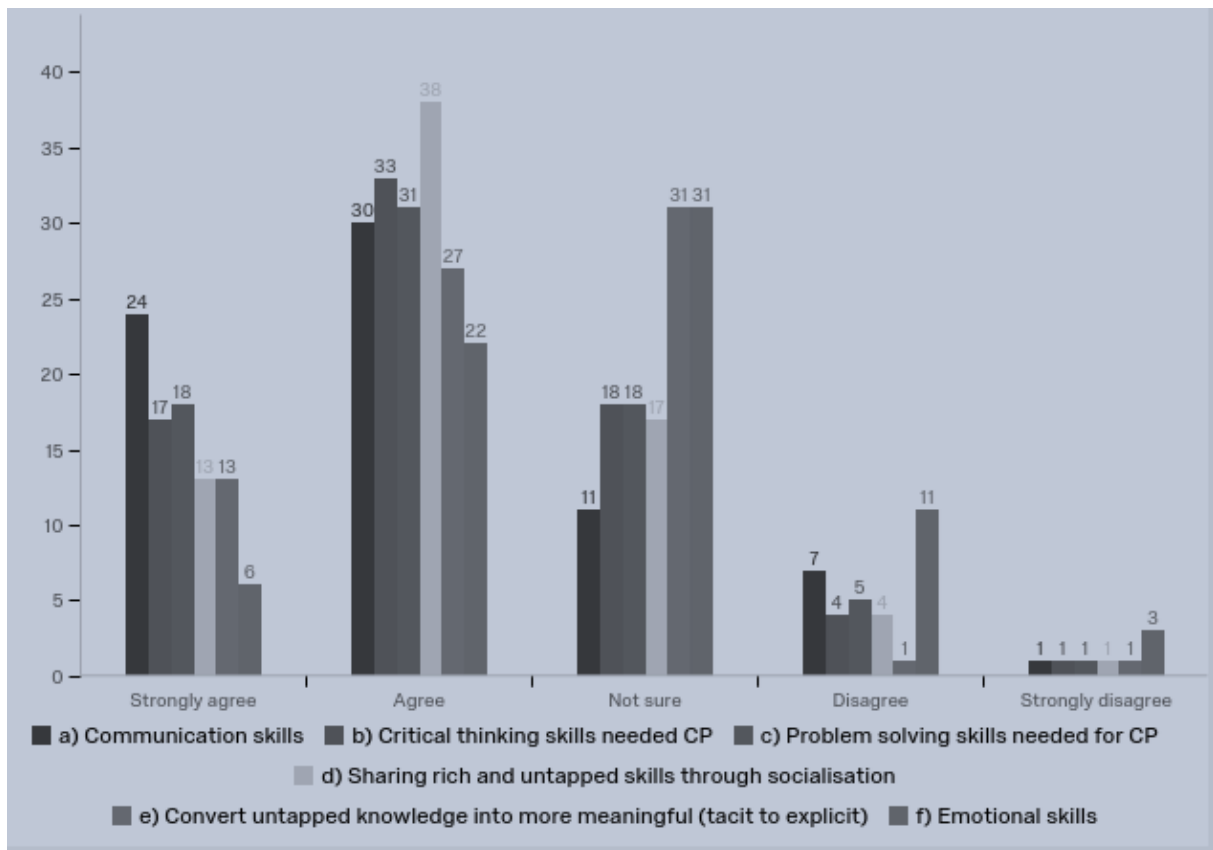


Figure 5. 21: Responses on skills

In summary, the researcher believes the results on communication, critical thinking, sharing untapped knowledge were sufficient to warrant the supposition that WhatsApp assists in gaining skills.

### 5.19.12 Competence

Table 5.30 shows participants' response when asked on the impact of WhatsApp on summative test ISAT and year mark in general. Of the total 73 respondents, there was a near balance of those who strongly agreed (n=7) that WhatsApp's impact on improving competence and those who strongly disagreed (n=6) with the question. A striking observation was that none of the respondents (n =17) attending the two TVET colleges classified as rural strongly agreed with the idea of improvement in competence. The researcher believes that such a question might have been answered differently if it was given to the participants in October after getting their final year mark from the subject lecturers. Overall, there was a perception that WhatsApp assisted in improving the competence as reflected in Table 5.30 but the number of participants who decided to select 'Not sure' as their answer was consistently high for the three options, casting some doubt on certainty of our claim.

**Table 5. 30: Response on competence**

	<b>Strongly agree</b>	<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Strongly disagree</b>	<b>Total</b>
a) Summative test mark	7	25	22	13	6	73
b) ISAT mark	8	24	20	15	6	73
c) Build a good year mark	8	21	26	12	6	73

### 5.19.13 Significance of WhatsApp interaction regarding instructional time

Of the 73 respondents who answered question 25, more than half (n= 63) were in agreement with the position that WhatsApp was useful in dealing with instructional time as shown in Table 5.31 row 2. The participants who felt that WhatsApp was significant were more than half of the respondents (n=46) despite a greater number of those who selected not sure (n=23) as reflected in row 3 column 4. Similarly, respondents were positive when asked whether WhatsApp is timely in dealing with instructional time. It is also surprising that none of the respondents strongly disagreed with any one of the three answers. However, as expected, the overall response for question 25 regarding significance of WhatsApp on instructional time was overwhelmingly positive, compatible with the thinking in the study (see Table 5.31).

**Table 5. 31: Significance of WhatsApp on instructional time**

	<b>Strongly Agree</b>	<b>Agree</b>	<b>Not sure</b>	<b>Disagree</b>	<b>Strongly disagree</b>
a) Useful?	21	42	8	2	0
b) Significant?	12	34	23	4	0
c) Timely?	13	32	24	4	0

### 5.19.14 Perception on recovered instruction time

Question 27 received 73 responses with most respondents revealing they were unsure whether they managed to recover enough instructional time lost during Computer Programming. Although nearly 40% (n=38.36%) of the respondents were positive to the question asked these results require due caution in the interpretation because the number is almost equal to ‘not sure’ respondents (n=34.5%) (see Figure 5.22). It is possible to suggest that possibly the amount of time lost was far too higher than amount recovered. Further analysis on the registers indicated that CC College lost more time than any other college, especially in term 1, but only three of its participants selected the ‘Not sure’ option. Instead, FB2 constituted 14 of the respondents who selected not sure as their response raising fears that there could be more time lost, but not recorded in the official documents.

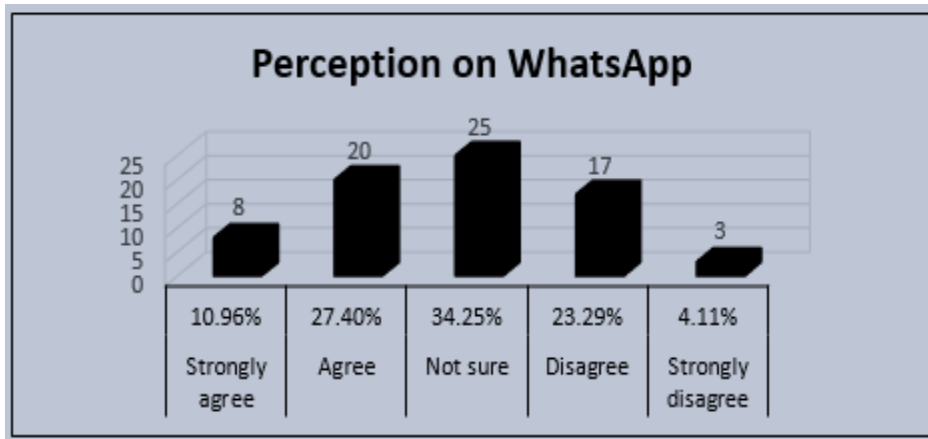


Figure 5. 22: Participant perception on WhatsApp for instructional time

Section 5.20 to 5.21 presents results from open-ended questions analysed with the use of thematic analysis.

### 5.20 Analysis of Open ended questions

Five open-ended questions (question 9, 19, 24, 26, 28; see Appendix 6) from the questionnaire were analysed using NVIVO software following six-stage phase of thematic analysis (see 4.8.2). Descriptive codes and sub-codes were assigned after generating a text query to find the 90 ‘most appearing’ words with a minimum of length of 10 letters (see Figure 5.23). As seen on the word cloud, the outstanding word was ‘understanding’, which could have been linked to high responses of not understanding the subject as later reflected by learner responses.

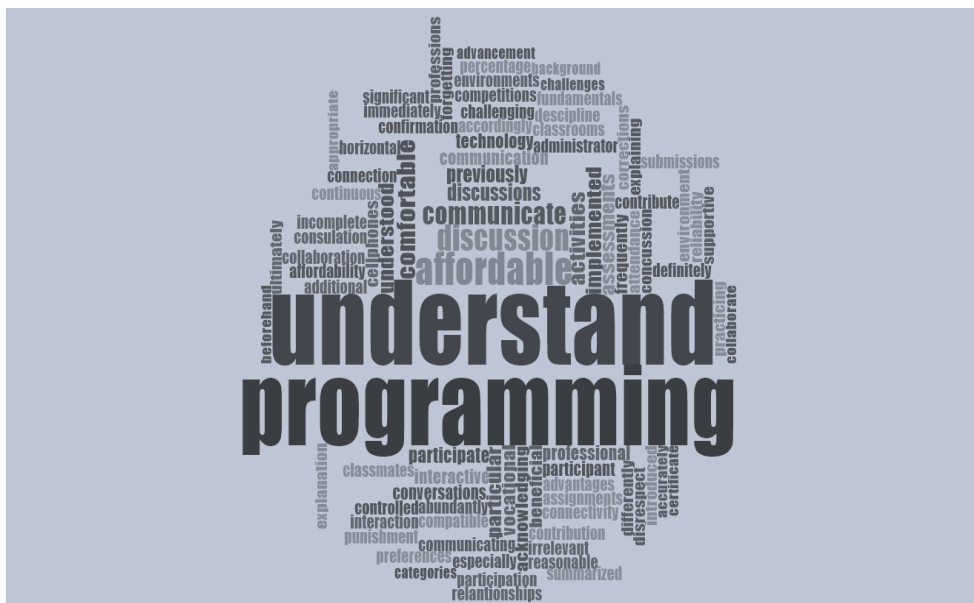


Figure 5. 23: Word Cloud Frequency for open ended responses

Section 5.20.1 discusses NCV challenges reflected from learner responses.

**5.20.1 NCV challenges**

Data was coded separately per question and then sorted as discussed in Phase 1 (section 5.11.8). Responding to question 9 regarding participants’ network preferences, two resulting sub-themes: network cost and connectivity obtained as shown on Table 5.32.

**Table 5. 32: Network preferences for participants**

Code	Sub-Code	Sources	Frequency
Network cost	Contract	5	48
	Special deals		
Connectivity	Network availability	4	10

The majority of the respondents (n=48) cited network cost as a deciding factor in selecting network preferences, for instance BC1-7 said: “Cell C, buying the WhatsApp bundle for 17 now with the included Facebook free connection helps a lot as I don’t have to buy as much data to talk with everyone”. Very few respondents (n=10) highlighted connectivity as deciding factor with no participants mentioning the factor from SC College. Results suggested that learners had challenges related to data cost and connectivity.

**5.20.2 Suggested interventions**

Question 19 from the questionnaire aimed at answering sub-research question number 4 which was put forward as: *What are the key factors contributing to differences in instructional time?* After analysing the data from the participants, an anchor code called suggested intervention was used which then stored the generated codes from the data as shown in Figure 5.24.

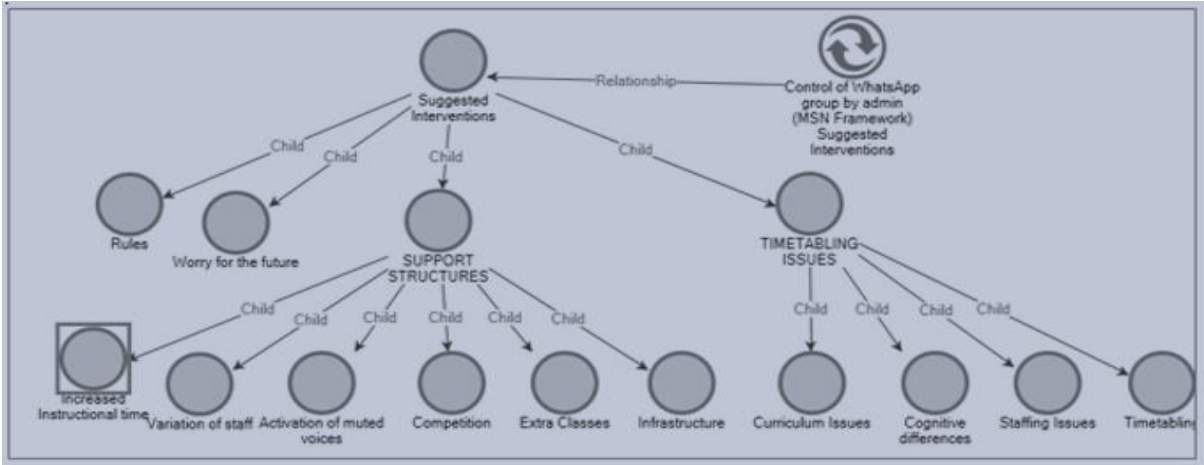


Figure 5. 24: List of codes and sub codes generated for suggested intervention

Using the steps outlined in section 5.11.8, codes were clustered based on frequency, sources and association with four resulting categories remaining: Support structures; Time-tabling issues; Worry for future and Rules. A matrix code was generated (see Table 5.33) to reflect the remaining themes from the categories. The findings revealed that rules only came from one source therefore it was dropped. Remaining three themes were then kept and these are discussed in the subsequent section.

**Table 5. 33: Categories for suggested interventions**

	Sources					Total references
	BC	CC1	FB1	FB2	SC	
Rules	0	0	0	1	0	1
Support Structures	3	5	7	10	8	33
Time-tabling	4	11	7	13	0	35
Worry for the future	0	0	1	1	2	4

**a) Support Structures**

From the data analysed, learners felt that various forms of support which included improvement in infrastructure, variation of staff, extra classes, competition and activation of muted voices had the potential of improving learning efficiency. Data extracted from NVIVO reflected high coding references (n=33) for support. To cite just a few examples of learners who identified issues of support, participant with ID CC1-3 said: “I think what needs to be done in order to improve, if we could have more equipment towards that particular subject”. SC1-1 highlighted the “need to have extra classes and in those extra classes ...” There was no mention of infrastructure issues from the two rural TVET colleges (SC and BC), contrary to what most rural institutions are well known for. A text query on extra time was extracted to highlight what respondents echoed and illustrated using a word tree (see Figure 5.25).

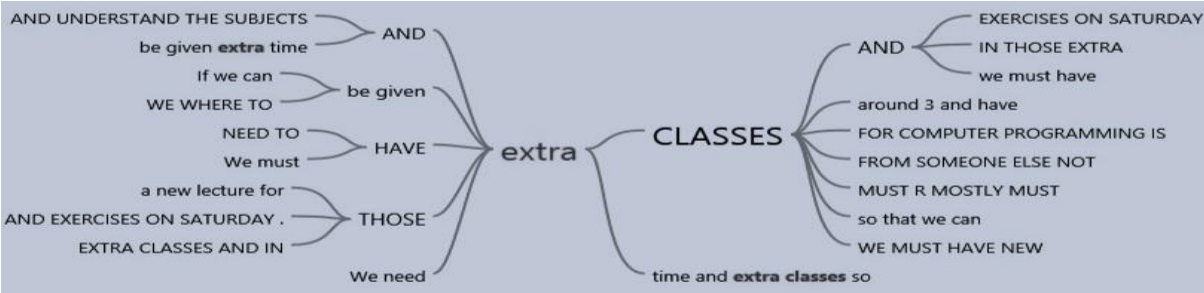


Figure 5. 25: Text search query on extra classes

In summary, the word tree highlighted learners’ plea for extra support needed for the subject.

## **b) Time-tabling**

The majority of the respondents (n=35) reported time-tabling as a contributing factor to learning efficiency issues. For instance, FB2-8 based at FB2 campus stressed that “Time is what is needed, there is only limited time. When you are about to get the gist the topic, that's when the bell starts to ring and the lesson is over”. In the context of this study, the results strengthen confidence in extending instructional time through WhatsApp when learners are at home studying.

One of the contributing factors clustered under the time-tabling issue was cognitive differences. A sizeable number (n=5) of learners indicated that learners of different abilities must be separated as mixing them hampers progress speed. BC1-4 said that: “Learning efficiency can be improved by separating students into High IQ and Low IQ categories. The lecturer would then have a different teaching style for each group ...”. As can be expanded from the data, it is probable that splitting learners according to cognitive abilities makes instruction design easier and has a potential to improve outcome.

In addition, learners suggested that there was need to address some issues related to curriculum to avoid comprising learning efficiency. BC1-3 mentioned that “To be honest, we need to get rid of these extra subjects like mathematical literacy, English and life orientation. I'm not saying it's a waste of time for most of us, but that it is tiring after each day with these subjects and I feel that it makes a person lazy”. The researcher's observation reflected that a number of NCV learners seem to be frustrated by repeating basic subjects like Mathematical Literacy, English and Life Orientation which they will have done already in high school. This is a direct appeal to the authorities to relook at the curriculum if learning efficiency is to be improved.

Increased instructional time code had an equal number of references to curriculum (n=4) and directly confirms the thinking behind this study that instructional time is lost and needs to be recovered. Apart from being lost, a number of learners felt that programming requires more time. SC1-7 requested that they should “get double periods for CP every day and ...” These results confirmed the researcher's observation on subject guidelines. Having taught the subjects since its inception, he realised that after the introduction of the practical paper in 2009, curriculum planners did not add more time on the subject guidelines. The same guidelines which were used in 2007 for a paper assessed theoretically remained the same until the time of this study.

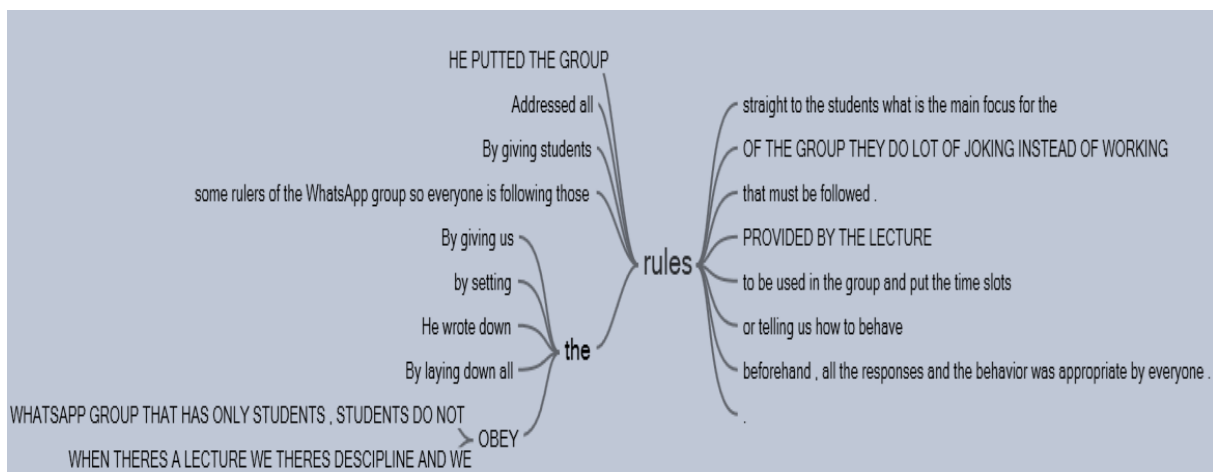
**c) Worry about the future**

Other notable concerns from the data showed that the participants were more concerned about the future after completing the course while others had concerns over the staffing. FB2-23 commented: “We need to start training the learners for the field and not just think of them as introductory level students.” This was an indication that learners were constantly thinking of their future beyond college life. The different codes highlighted (support structures, time-tabling issues and worry about the future) were an attempt to address the sub-question stated as: *What are the key factors contributing to differences in instructional time?*

**5.21 Control of WhatsApp group**

Results from question 20 seem to suggest the importance of rules to ensure success of WhatsApp groups. For instance, FB2-7 said that “He asked questions and some of the student answer if they know the question and if not, the admin will tell us the answer. In that way there was a flow of discussion”. Similar sentiments were shared by BC1-1 saying “the admin was very interactive with the learners and always trying to keep the flow of the WhatsApp group chat alive and beneficial to all parties”. In so doing all the learners felt that they were given equal attention. While it is acknowledged that coding might be subjective, the prevalence of the sentiments from all the four colleges strengthens the code.

In addition, rules enforced by the researcher at the beginning of the study were observed to have made a positive impact towards controlling flow of discussions. A text query extracted from NVIVO shows some of the sentiments shared by participants (see Figure 5.26).



**Figure 5. 26: Text Query on rules**

Another striking result to emerge from the data was the issue of immediacy of feedback shared by learners, for example CC1-14 mentioned that “... answering all questions as soon and fast as he could”. Contrary to the researcher’s expectations, the subject lecturers were not quick to respond to the group discussion, raising fears of possible resistance. Not surprisingly, responses appear to suggest that the lecturer presents cemented authority easing control and flow of discussions because there is still an element of respect despite the platform being a social one. This concept is well supported by BC1-7’s response, who reiterated that “... guiding the conversation towards a learning point of view”. In support of the belief shared in this study, learners highlighted that use of rules within WhatsApp groups was one of the best control measures to achieve success of MSN.

The resulting classification is represented below using coding references split according to sources as shown in Table 5.34.

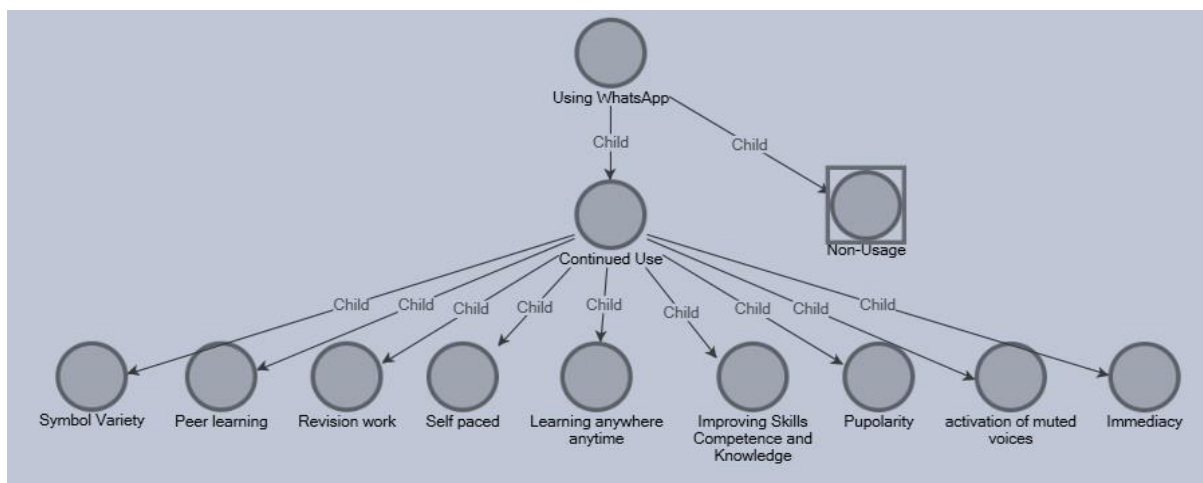
**Table 5. 34: Key codes for control of WhatsApp groups**

	Sources					Total references
	BC	CC1	FB1	FB2	SC	
Immediacy	0	1	0	8	0	9
Interaction	3	8	5	3	0	19
Focused discussion	2	4	0	1	3	10
Privacy and Security	0	0	0	1	0	1
Rules	0	4	3	7	5	19

Responses in this section were answering research sub-question number 3, which reads: *How can an integrated mobile learning model guide TVET practitioners and policy makers in addressing Instructional Time issues?*

## 5.22 Use of WhatsApp in Computer Programming

Regarding further use of WhatsApp for participants who responded to the question whether WhatsApp should continue to be used for Computer Programming, more than three quarters of them supported the idea. Out of the 73 participants, 72 were coded into two broad categories: non-usage (n= 4 references) and continued use (n=68 references). The remaining participant gave a neutral answer so could not classify it as in support of continued use or non-use. The resulting codes were extracted from NVIVO and displayed using a project map (see Figure 5.27).



**Figure 5. 27: Reasons for continued use of WhatsApp**

Following the coding processes, two anchor codes were used: continued use and non-usage. The codes were categorised using the steps outlined in section 5.11.8. Table 5.33 shows the codes grouped under continued use. Looking further at the coding matrix, it can be noted that peer learning had the least references (n=4) but its existence in three sources (BC, FB1 and SC) was suggestive of its worthiness. Braun and Clarke (2008) highlighted importance of prevalence of codes rather than frequency.

**Table 5. 35: Perceived Benefits**

	Sources					Total references
	BC	CC1	FB1	FB2	SC	
Mobility	1	6	4	10	4	25
Peer Learning	1	0	1	0	2	4
Popularity	2	6	8	6	4	26
Scaffolding	3	5	2	3	0	13

### 5.22.1 Adoption of WhatsApp in Computer Programming

#### a) Popularity

There seemed to be a shared consensus from the respondents (n = 26 references) on the continued use owing to the popularity of WhatsApp. Literature (Statistica, 2017; Nyasulu & Chawinga, 2019) has shown the popularity of WhatsApp and how people with shared commitments can make use of the application (Nyasulu & Chawinga, 2019). the popularity theme appeared in all five sources, with highest references being witnessed at urban colleges as reflected in Table 5.33. It can be inferred that popularity seem to influence usage among learners as non-users will most likely join in an attempt to be identified with their peers and also for mutual gain.

## b) Mobility

Mobility refers to affordances offered by the mobile devices and these include learning anywhere anytime. Participants supported the idea that WhatsApp extends learning without any boundary worries and geographical space difference. One notable example was from participant CC1-10, who responded by saying: “Yes. It helps learners to ask questions when studying at home”. Learners have the chance to experience instructional time from anywhere (Duncheon & Tierney, 2013). Figure 5.28 provides extracts from the learners regarding learning anywhere anytime.

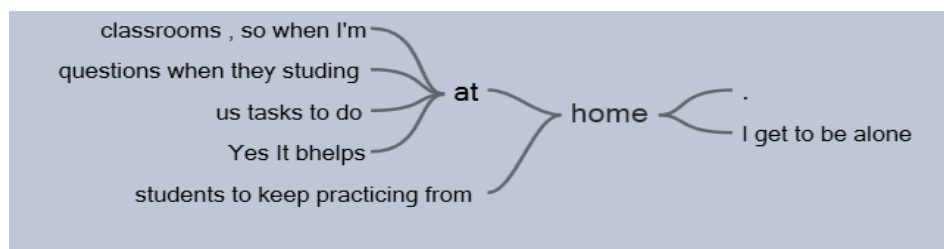


Figure 5. 28: Text search query on learning from anywhere

Another aspect of importance was symbol variety. As Spencer and Hiltz (2003:3) note: “Symbol variety refers to the ways information can be transmitted by the medium”. A sizeable number of participants (n=8) highlighted the capability of WhatsApp to communicate in many ways, like incorporating text, audio, and videos on the group chat for Computer Programming as one of the reasons why they continue to use the application. For instance, BC1-4 said: “Yes. Students can upload pictures to problems that they have and others in the group can respond with another picture with the solution. Even videos of how a program operates can be sent.” The same sentiments were shared by another participant SC1-6 who said: “Yes, because it allows videos and voice notes.” Participants were able to post emojis and text messages to convey their messages. What is striking about the shared sentiments was that both participants are from the TVET colleges classified as rural. One key point here is that participants articulated the same issue which in itself signals convergence of perception and experience. WhatsApp enhances self-paced learning with the potential of extending instructional time. For instance, FB2-8 said “Yes. I get lost most of the time in classrooms, so when I'm at home I get to be alone and read and that's when I get to ask things that I didn't get and that's when they become clear when I'm reading alone”. Contrary to earlier thoughts, there was limited harmony on issues such as improving skills, knowledge and competence and popularity. Nonetheless, the results revealed considerable agreement on the contribution of WhatsApp in scaffolding discussed in the next section.

**c) Learner scaffolding**

Of the 13 references for this code, the majority were from CC (n=5) with BC and FB2 having an equal number of references (n=3) and FB1 with the only two references. SC had no participants who highlighted scaffolding as a possible contribution to their desire for continued use. The occurrence of the theme in four sources provides reasonable power to the findings despite one college classified as rural (SC) not supporting the idea. Nonetheless, there was support for the view from another college classified as rural (BC) to offer meaningful representation. BC1-1 responded by saying: “Yes, it is very helpful in terms of keeping up to date with work through revision or helping others with specific programming questions”. The researcher wish to stress the idea that while frequency of references was minimal for rural representation, the mention in other colleges classified as urban gave enough ground to support the theme.

**d) Peer Learning**

The responses to question 24 on whether WhatsApp should continue to be used for Computer Programming signify the importance of peer learning associated with MSN environments like WhatsApp. The researcher also concurs as to the diversity of opinions identified in the connectivist learning theory since different learners tend to answer the question differently in response to any question. Agreeing with the connectivist principle of diversity in opinions (Siemens, 2004; Verhagen, 2006: Kop & Hill, 2008: Goldie, 2016), the researcher would suggest that WhatsApp offers a variety of answers which learners can make use of depending on their understanding. BC1-6 acknowledged this by saying: “Yes, depending on the class group participation, it can help other learners as sometimes learners can explain it differently as the way they understood to do something which someone else might be able to understand better”.

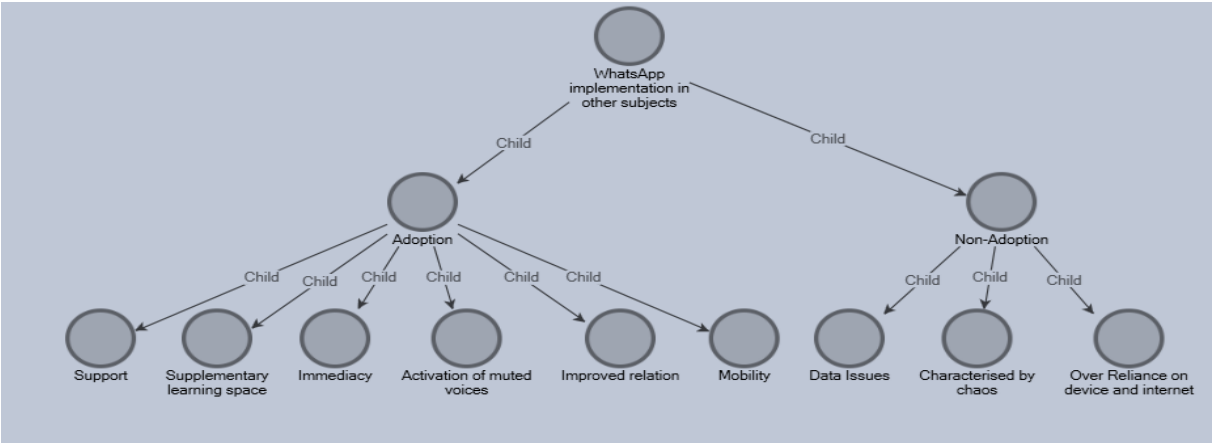
**5.22.2 Non-usage of WhatsApp in Computer Programming**

Of the 72 responses, only four reported to be against the idea of continuing to use WhatsApp for Computer Programming and surprisingly they were all from FB2. FB-23 indicated that “... WhatsApp can pose a danger to learning I, would prefer if it was more professional e.g.: e-mails”. Participant FB2-1 shared the same negative sentiment by saying: “No. It's not helpful to me. I'd rather learn at school”. Although responses to question 24 showed mixed reactions, most of the respondents (n=68) indicated that they would prefer to continue using WhatsApp for learning Computer Programming. On the same note, there were also striking points to note which were raised by participants against the continued use of WhatsApp, such as device

availability and privacy concerns. Nonetheless, the data still confirms the researcher’s conjecture that instructional time can still be extended using MSN applications, but due care still has to be practised.

**5.23 Implementation of WhatsApp in other subjects**

Responses to question 26 on whether WhatsApp should be implemented in other subjects were split into two broad categories: adoption and non-adoption. The responses aimed at addressing research question 4 (refer to Table1.1): Figure 5.29 presents an overview of the two categories (adoption and non-adoption) together with sub-codes.



**Figure 5. 29: Implementation of WhatsApp in other subjects**

Of the 73 responses, most of learner (n=60) advocated for the implementation of WhatsApp in other subjects. Eighteen percent of the respondents (n=13) expressed themselves against the implementation of WhatsApp in other subjects.

**5.23.1 Adoption of WhatsApp in other subjects**

As reflected in Table 5.36, adoption had two key sub-categories: mobility and support; these are described in this section.

<b>Codes</b>	<b>Sources</b>	<b>References</b>	<b>Sub-Categories</b>	<b>Sources</b>	<b>References</b>
Immediacy	2	2	<b>Mobility</b>	4	10
Mobility	3	4			
Activation of muted voice	2	4			
Support	5	43	<b>Support</b>	5	50
Supplementary learning space	3	6			
Improved relation	1	1			

**a) Mobility as a reason for implementation**

When asked whether WhatsApp should be implemented in other subjects, the mobility theme appeared again (as noticed earlier in question 24) but only from four sources in contrast to five as in Table 5.33. A comparison diagram (see Figure 5.30) was created using NVIVO to show commonalities between the two themes which emerged from a different question. As can be seen from the diagram, there were six learners (FB2-5, FB2-18, CC1-11, SC1-6, SC1-7 and SC1-8) who shared the same sentiments to both question.

From the evidence reflected in Figure 5.30, it can be inferred that mobility is a strong factor with regards to adoption and continued use of mobile social networks applications like WhatsApp in the learning process.

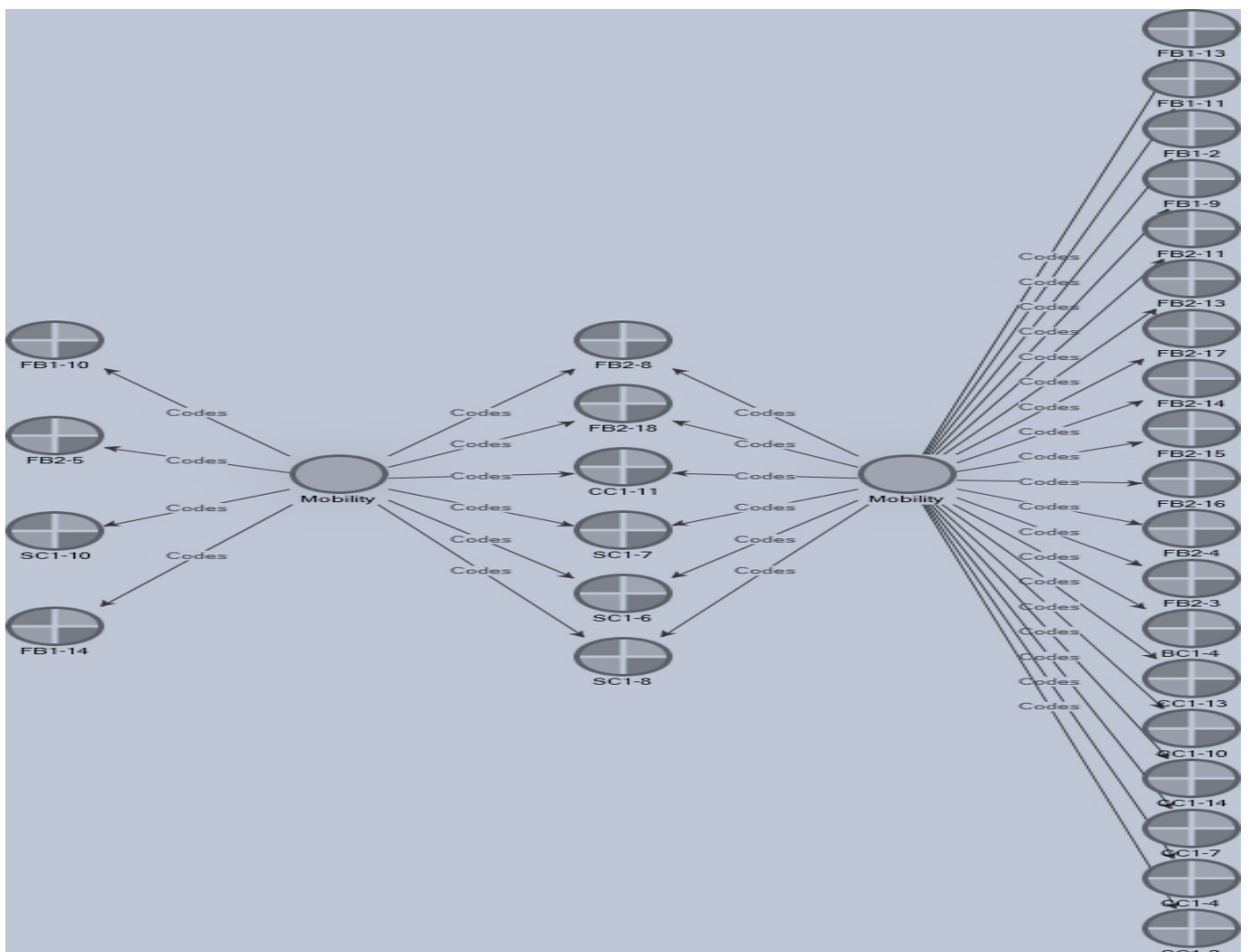


Figure 5. 30: Comparison of Mobility theme

## b) Support

Support emerged as a strong theme for implementing WhatsApp in other subjects as reflected by the number of references obtained (n=50 references). It will be noted that just as with mobility, support emerged again in response to implementation of WhatsApp in other subjects. For instance, Figure 5.31 shows what BC1-6 and CC1-13 said respectively with regards to support through use of WhatsApp.

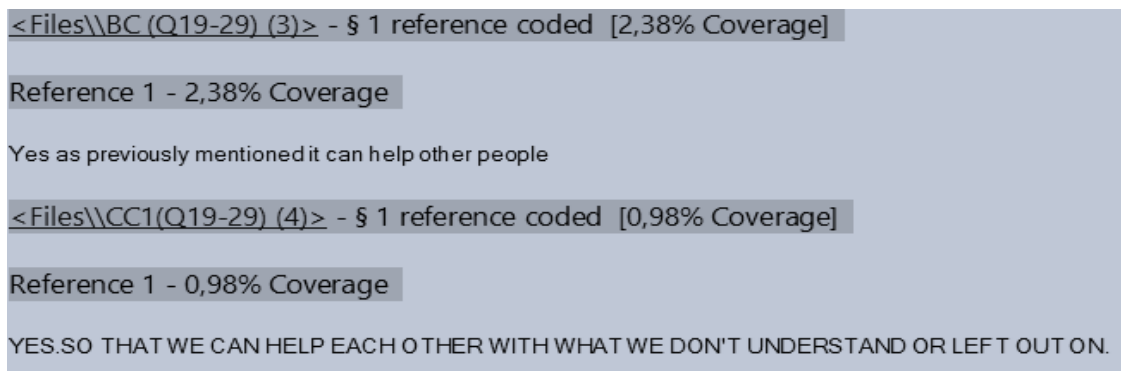


Figure 5. 31: Responses on support as reason for adoption

### 5.23.2 Non-adoption

Just under 20 percent (n=13) of the total responses to Question 26 advocated for non-adoption of WhatsApp for learning other subjects, citing o major concerns (chaos, and data and over-reliance on internet) as discussed below.

#### a) Chaos

On the issue of chaos, one participant commented: “No, it can cause some confusion because I will be doing other subject while someone tells me about the other one”. The sentiment corroborates participants’ responses reflected in Table 5.24(e) where some learners cited posting of messages the whole day long as a challenge in using WhatsApp. Though the numbers do not tally, possibly the few learners who cited data issues as reason for non-adoption might have been part of the same group. However, drawing parallels from the literature, Siemens (2004) points out that one of the principles of connectivism theory is chaos. This can be used to explain how participants can take advantage of the chaos.

#### b) Data Issues

A recurrent negative issue on the question regarding implementation was a sense among learners that data issues are a challenge which may affect implementation of WhatsApp in other subjects. As BC1-4 said: “No. Too many subject groups on WhatsApp would require the student to spend too much time on their phone and would require more data”. Surprisingly, contrary to

expectation, very few (n=2) participants cited data issues. There seemed to be a discourse in terms of numbers for people who cited data issues in the open-ended question compared to those in closed-ended question (see Table 5.24 reason a).

In an attempt to compare the two themes: non-adoption from Question 26 and non-usage from Question 24, yielded the following results as reflected on the comparison diagram in Figure 5.32.

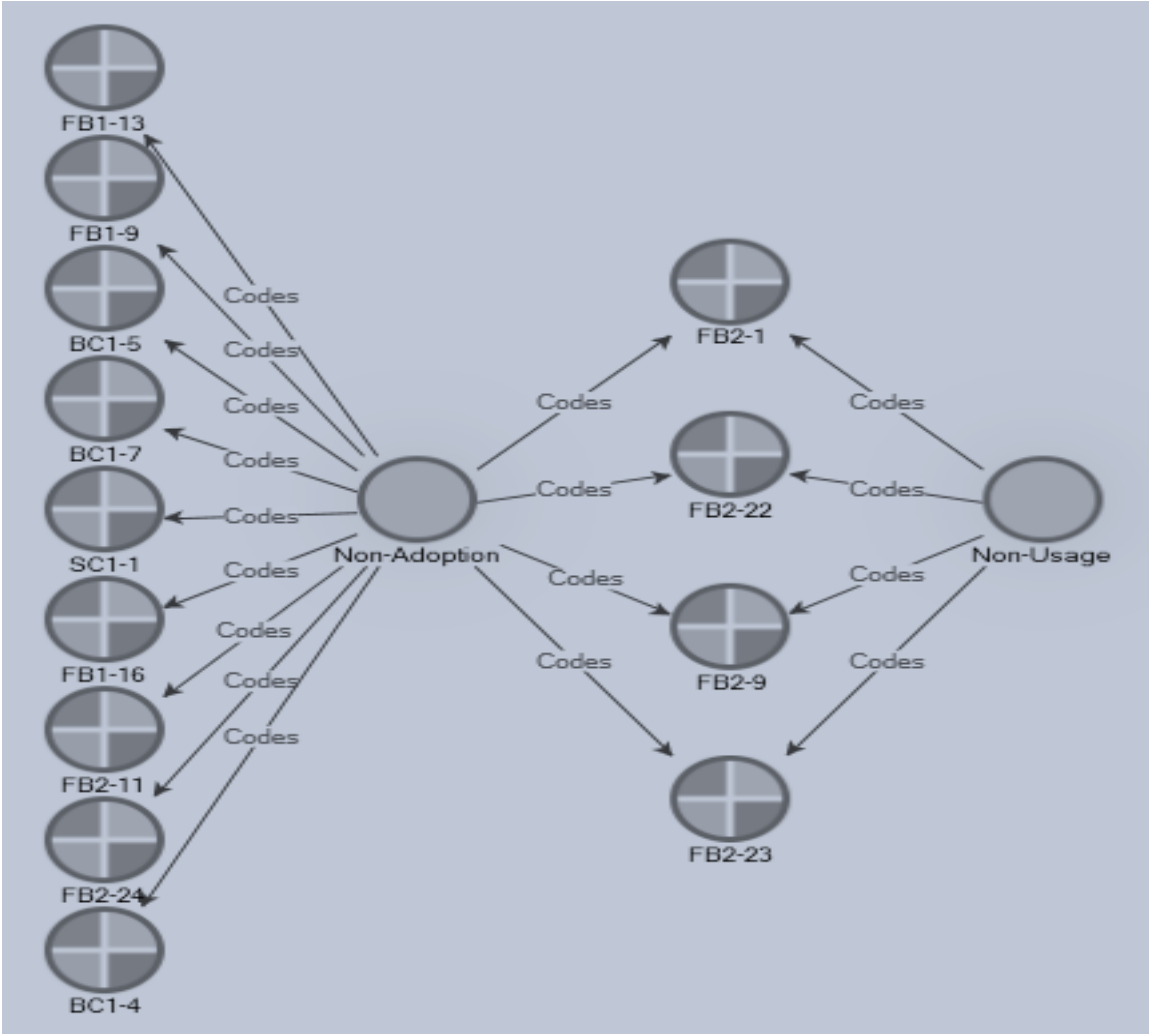


Figure 5. 32: Comparison of non-usage and non-adoption of WhatsApp

As reflected in Figure 5.30, there were four participants, coincidentally all from same college (FB2), who consistently were against adoption and use, indicating an association between the responses. The next question presents findings on perceived impact of lecturer-led WhatsApp groups.

## 5.24 Perceived impact on Lecturer-led WhatsApp groups

Participants were asked to give their perception on WhatsApp group with lecturers in comparison to these without lecturers, and 73 references were obtained. The question was asked as: *In your opinion, do you feel that WhatsApp group with lecturers have more impact for learning than those WhatsApp groups with students [learners] only? (Yes/No) Give a reason with examples.* Data on impact of lecturer-led WhatsApp groups is presented first in section 5.24.1 followed by data on non-impact of lecturer in section 5.24.2.

### 5.24.1 Impact of lecturer-led WhatsApp group

Of the 73 participants who answered Question 28, the majority (n=63) were of the perception that lecturer-led WhatsApp groups had more potential in extending instructional time and perhaps improving learning outcomes. Figure 5.33 indicates a list of the resulting themes and linked sub- themes and relationships. Using a categorisation technique highlighted in section 5.11.8, the researcher explains the four themes: Focused discussion, Leading and Confirmation, Rules, and Motivation. There was a relation between rules and focused discussion and motivation, and leading and confirmation, as in Figure 5.33.

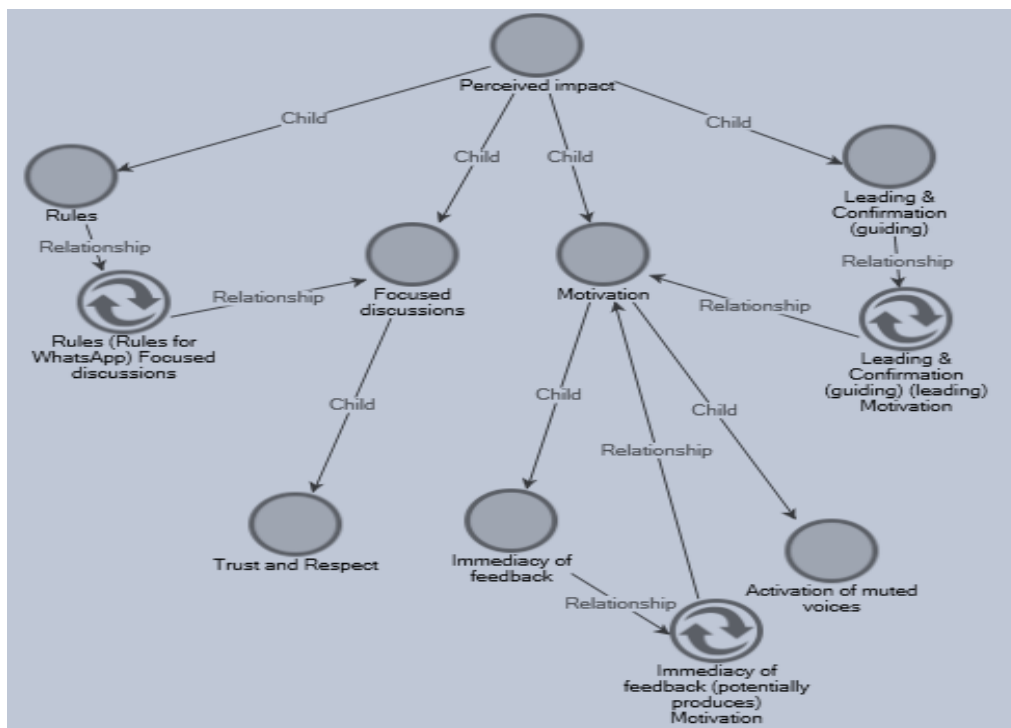


Figure 5. 33: Sub- themes for lecturer led WhatsApp groups

In an attempt to show how well spread the themes were, the researcher extracted the data from NVIVO software to show frequency of the code from each source, as shown in Table 5.37.

**Table 5. 37: Resulting categories on lecturer-led WhatsApp group**

	Sources					Total references
	BC	CC1	FB1	FB2	SC	
Focused discussions	3	10	4	6	7	30
Leading and Confirmation	0	3	7	13	1	24
Rules	0	2	1	1	1	5

The three categories shown in Table 5.37 are discussed below.

**a) Focused discussion**

Focused discussion is when learners are having discussions which are in connection to what they are expected to learn for a particular subject. Most of the respondents (n=30 references) were positive about the impact of lecturers, suggesting that lecturer-led groups lead to focused discussion. For instance, CC1-12 responded: “Yes, there are boundaries, with students it can become chaotic and unorganised, whereas when lecturers are also in the group we can use the group for the intended purpose which is to learn and ask what we did not understand in class”. While chaos (Siemens, 2004) may be good, it may potentially mislead other learners who may not be in a position to identify intelligent nodes. However, with the lecturer as a member of the group, he/she may potentially assist learners to have focused discussion because of the trust and respect he/she commands. This was further supported by participants from BC who said: “Yes, the groups with students only tend to have more horseplay as where the groups involving lecturers focus more on the significant matter at hand”. The theme attracted support from all the sources, raising its credibility in assisting to increase instructional time using MSN such as WhatsApp.

**b) Leading and Confirmation**

In the current study, ‘leading and confirmation’ indicate the guidance and expectations that the learners need in order to perform in Computer Programming. Most of the learners (n=24) cited leading and confirmation as a major factor which lecturers can potentially enhance within WhatsApp groups meant for extending instructional time. As highlighted by CC1- 11’s comment: “Yes, WhatsApp groups with learners are also very effective but with a lecturer we could maybe get a better understanding and a confirmation whether something is right or not”, it can be deduced that the lecturer’s involvement assists in moderation of the discussions. One striking feature was the absence of the theme from BC College and only one reference from SC, another college classified as rural. It can be noted that the theme was more prevalent in colleges classified as urban. The researcher also observed a similarity of sources between

motivation and leading and confirmation, and therefore concluded that there existed a relation between the two. Leading and confirmation potentially motivate the learners to participate in the discussions and may result in extended instructional time.

**c) Rules**

Rules are the guiding principles for control and participation for all the group members, which in the current study were given to learners in the beginning. Literature (Frohberg, Göth & Schwabe, 2009; Imtinan, Chang & Issa, 2013) also mentions control as important in mobile learning. While very few of the participants (n=5 references) from the four sources thought that lecturer presence helps to enforce rules within the groups, the researcher believes that it is a worthy theme as earlier noticed in the response to Question 20. (refer to Table 5.37). Rules were cited as the foundation for focused learning which received second highest references (n=30). FB2-14 said that “Yes, groups that are not managed by a higher authority are usually a waste of time, there is no control, no order”, indicative of a possible relationship with focused discussions.

**5.24.2 Perceived Non-impact of lecturer on WhatsApp groups**

Out of the 73 respondents, very few (n=10) were of the perception that lecturer-led WhatsApp groups will not have an effect on instructional time and learning outcome. Figure 5.34 shows the categories of perceived non-impact of a lecturer-led WhatsApp group. FB2 and BC had the highest number of participants (n=3) who were negative when asked about the importance of the lecturer on the WhatsApp groups meant for extending instructional time. Not surprisingly, BC had an equal high (n=3) response for participants who were negative on the issue of lecturer-led groups. This was also observed by the limited participation of learners in WhatsApp groups.

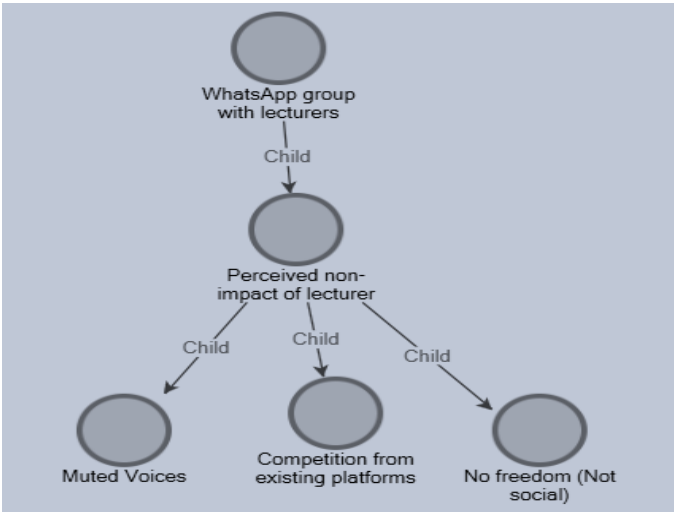


Figure 5. 34: Perceived perception on non-impact of lecturers on WhatsApp groups

For example, FB2-2 stated that: “No, we can’t be free in the group if there is a lecturer and we can’t even ask questions because we are afraid it will be like we are exposing them by asking the things that they did tell us in the class, so they will feel like we are trying to say they are not doing their job well”.

Another notable aspect which emerged from the data (see Figure 5.34) was competition from existing platforms. BC1-6 said: “No, as not really much can be done as BC is using Moodle; it helps already with things to do”. This was an indication that lecturer-led WhatsApp group might not work if there are competing platforms which the college will be using. Although this sentiment came from only one participant, it is believed that the lecturer might have privately forced the learners to communicate more on Moodle which he was spearheading at the college.

Results on the question of lecturer-led WhatsApp groups suggest that learners perceive the mentioned groups as productive since lecturers’ presence may potentially result in motivation and focused discussion through enforcing rules. Nonetheless, it should be noted that in some instances, the presence of the lecturer has a potential for a negative impact on the success of WhatsApp group owing to student’s perception of fear of the lecturer. Table 5.38 presents a summary of the emerging themes which is drawn to highlight important data to emerge from the questionnaire.

**Table 5. 38: Summary table of emerging themes**

<b>Theme</b>	<b>Categories</b>	<b>Codes</b>
<b>Suggested Interventions</b>	<i>Support structures</i>	Extending IT, Variation of staff, Activation of muted voices, Competition, Extra classes, Infrastructure e.g. Wi-Fi and Labs
	<i>Time-tabling</i>	Curriculum issues, cognitive differences,
	<i>Worry for future</i>	Staffing issues
<b>NCV Challenges</b>	<i>Resource Constraint (access to Wi-Fi at the college triangulation)</i>	Network costs, connectivity
<b>Curriculum-wide Implementation</b>	<i>Adoption Mobility Support</i>	Immediacy, Activation of muted voices Supplementary learning space, Improved learner-lecturer relation
	<i>Non adoption</i>	Privacy Data Issues, Chaos, Connectivity, Internet/Device Issues
<b>Perceived Benefits/ Triangulation with quantitative data on Usage of MSN (popularity)</b>	<i>MSN affordances</i>  <i>Social Affordances</i>	Symbol variety Immediacy Mobility Peer learning Popularity Scaffolding
<b>Perceived impact of lecture-led groups</b>	<i>Focused discussion</i> <i>Leading and confirmation</i>	Rules, Trust and respect, Extending instructional time Motivation, Activation of muted voices, Immediacy of feedback

### 5.25 Reflect phase of PAR2

When lecturers perceive the potential value of MSN as positive and the existence of framework for use towards extending instructional time, they are more likely to collaborate with learners positively. Together, qualitative and quantitative data highlighted issues causing instructional time loss, what learners thought needed to be done, the expected impact of MSN intervention, and potential challenges. Quantitative results reflected some improvements in skills as indicated by the test scores for practical and ISAT. More focus on improving knowledge was needed to prepare for the internal examination. This was to be achieved through increased interaction in Phase 3.

### 5.26 Participatory Action Research Phase 3

Qualitative data was obtained through student interviews while term 3 attendance registers and internal exam scores provided the quantitative data.

### 5.27 Plan for PAR3

One of the findings from Phase 2 was a request for Computer Programming videos-targeted practical exam. Inherently, learners who fail the final exam struggle with the practical aspect. The learners wanted more videos to prepare them for the practical exam. A total of 32 of the targeted 40 learners were interviewed using convenience sampling (Bryman, 2008) as these were the ones available and ready to be interviewed. With each interview approximately fifteen minutes long, the researcher managed to collect eight from each of the three urban campuses and four from each of the two rural colleges who were randomly selected. He had anticipated interviewing eight from BC and SC, but during the dates of interviews, participants had received exam permits and decided to grant themselves “unofficial study leave”, hence ended up with four despite the date for interviews communicated to them in advance.

Table 5.39 shows a general demographic overview of the interviewees. From the 32 participants, figures in row five shows that the majority (n=21) had completed Grade 12 while that of row 2 shows that very few (n=1) had only Grade 9 before enrolling for NCV.

**Table 5. 39: Highest grade before NCV**

	Female	Male	Total	%
<b>Grade 9</b>	0	1	1	3
<b>Grade 10</b>	0	5	5	16
<b>Grade 11</b>	0	5	5	16
<b>Grade12</b>	5	16	21	66
<b>Total</b>	5	27	32	100
<b>%</b>	16	84	100	

Further, the data showed that all interview respondents from BC and SC had attained Grade 12 (see row 5), while only one learner from FB1 had Grade 9 as lowest level of education before enrolling for NCV level2. It was also interesting to note that FB2 had only Grade 11s as the lowest level of education. The next section analyses the interview responses from the learners generating categories and themes. Demographics presented in Table 5.39 confirm mixed abilities.

### 5.28 Analysis of learner interview responses

An inductive process was adopted in the analysis of interview responses. The unit analysis in the interview were the learners. The questions were analysed according to the research questions.

### 5.28.1 Extending Instructional time

Out of 32 interviewees, the majority of the respondents (n=26) highlighted the presence of instructional time loss and suggested the need to extend learning time. FB1-9 stated that, “Yes, we have known that from the start. It is not just when you came here but since we were in Level 2, we do lose a lot of time especially with this ...”. The same sentiments were also echoed by BC1-1 from BC College who said, “Yes, I do agree to that. We do lose a lot of time because there are maybe a lot of things that do interfere with our lives. We can’t do things on time ...”. Surprisingly, only half of the respondents from BC College supported the need to extend instructional time, while other colleges had more than three quarters from the college contribution. On the question of using MSN to recover the lost time, very few participants (n=4) suggested that time was not recovered and as expected three of them were from BC College where participation was very minimal and surprisingly one from FB2. In support to the statement of not recovering time, for example BC1-4 said: “Opinion on the whole WhatsApp group! I think no. Because there is not much technical chat in our specific group”.

As suggested in the literature review, the call for learning efficiency was to make sure that learners attain expected knowledge, skill and competence. Results of learner responses on what they thought they benefited from using WhatsApp is presented in Table 5.40.

**Table 5. 40: Cross-table on improvements from WhatsApp**

Improvements	Colleges					Total (32)	
	FB1	FB2	CC1	BC	SC	Count	%
Competence	3	0	4	0	0	7	21.88
Knowledge	5	7	1	1	1	15	46.88
Skill	1	1	3	0	3	8	25
<b>Total (unique)</b>	8	8	7	1	4	28	87.5

The data reflects an interesting account of improvements experienced by the participants. The majority of the respondents (46.88%) suggested that they had made reasonable improvements in knowledge. As narrated by one of the respondents, FB2-26:t “I would say theory because certain times that I myself would struggle to grapple with certain things like abstraction like you mentioned there.”. What was worrying was the number (n=7) of learners who thought their competence had improved as a result of WhatsApp. On another note, it was interesting to see that there were cases where participants felt themselves to have gained more than one aspect of learning efficiency. For instance, CC1-3 claimed to have gained competence and skill.

Similarly, FB1-16 claimed to have gained knowledge and competence. Overall, the majority (n=28) of the learners claimed to have gained either knowledge, competence and or skill. Having responded to extending instructional time questions, the researcher requested the learners to air their views on differences on instructional time. The responses are given in the next section.

### 5.28.2 Feedback on preferred contact style

Learners were asked to suggest the contact style which they preferred from their lecturers when using WhatsApp, and a summary of responses were cross-tabulated as shown in Table 5.39.

It is apparent from the results in Table 5.41 that the majority (50%) of learners interviewed from five colleges preferred deflecting contact style. For instance, SC1-7 suggested: “I expect him to be professional the way he is. Like I need to follow what he wants me to do. He doesn’t have to follow me.” This perhaps suggests that they require the presence of the lecture for focused discussion. These findings were also similar to those in Phase 2. From the data, none of the participants preferred lecturers to adopt confluence contact style. This is in contradiction to what the lecturers preferred as indicated from results in Phase 1 where 40% suggested confluence style. Surprisingly, half of retroreflection contributors (n=4) were from FB2. One discrete observation was the negative feeling that learners from FB2 had with the lecturer, as suggested from FB2-2’s comment: “I think the lecturer should be free so that we can be able to communicate with the lecturer without having any fears”. FB2-22 stated that “No. ... Not all of us understand and we’re not on the same track. ... Not just to give an answer”. This was further coded as student-lecturer relationship in response to challenges. Very few learners (n=1) preferred projecting contact style, suggested a mixed response from that of the lecturers interviewed in Phase 1.

Table 5. 41: Contact style choices

		Colleges					Total (32)	%
		FB1 (8)	FB2 (8)	CC1 (8)	BC (4)	SC (4)		
Contact styles	Confluence	0	0	0	0	0	0	0
	Deflecting	6	2	5	0	3	16	<b>50</b>
	Desensitising	0	1	0	1	0	2	6.25
	Introjecting	0	1	1	2	0	4	12.5
	Not sure	0	0	0	1	0	1	3.13
	Projecting	0	0	0	0	1	1	3.13
	Retroreflection	2	4	2	0	1	9	<b>28.13</b>
	<b>Total (unique)</b>	8	8	8	4	4	32	100

In the next section, the researcher review responses on usage of MSN, WhatsApp to extend instructional time.

### 5.28.3 Differences in instructional time

Table 5.42 shows an overview of responses to the question on differences in instructional time during Term 3. The majority of the learners (n=8) mentioned transport issues as the leading cause, with 75% of them being from CC College. Not surprisingly, there was no mention of transport issues from SC College as most of the participants were within walking distance from the college. Lecturer absenteeism and learners bunking were cited as the least contributors of instructional time differences in Phase 3. A discourse which emerged was that 25% of the learners did not recall having lost time in term 3. When asked if they had lost instructional time in term 3, FB2-2 responded, “No, I do not recall any disturbances but term 3 was short”. With regards to transport issues, the factor has been recurring in all Phases.

**Table 5. 42: Causes of differences in instructional time**

	Colleges					Total (32)	
	FB1 (8)	FB2 (8)	CC1 (8)	BC (4)	SC (4)	Count	%
<b>Transport Issues</b>	0	1	6	1	0	8	25%
<b>Time-tabling Issues</b>	4	0	0	1	0	5	15.63%
<b>Protest Action</b>	0	0	2	0	2	4	12.5%
<b>Lecturer absenteeism</b>	0	1	0	1	0	2	6.25%
<b>Bunking</b>	0	1	0	0	0	1	3.13%
<b>No time lost</b>	2	3	0	1	1	7	21.88%
<b>Total (unique)</b>	6	6	8	4	3	27	84.38%

Transport issues consistently appeared as a big challenge to instructional time in all phases.

### 5.28.4 Using WhatsApp to extend Instructional Time

Moving to the question of using MSN, few learners (n=7) claimed that responses were not reliable and these were from FB2, CC, SC and BC Colleges only. As FB2-26 puts it: “Most of the answers that were given to the questions, it’s not answering the question or related to that question; maybe they did not understand the questions ...”. Nonetheless, there were four key aspects as shown in Table 5.43 to emerge from the question: reprocessability (3.13%), multiplicity of connections (28.13%), intelligent nodes (81.25%) and currency of connections (53.13%).

When a comparison was made, all the participants coded under intelligent nodes were also found under multiplicity of nodes, suggesting an association between the two. Moving onto intelligent nodes, when asked whether learners were able to identify people giving correct answers, FB1- said “Yes, I was able to. I have quite good connections with the people that do answer and if I needed something personally answered I could message them personally if I required”. Similar sentiments were also echoed by CC1-3 as suggested by the statement “Yes. I was able to identify them those who were always giving the correct answers”. From the data shown on Table 5.43, issues of reprocessability (3.13%) were not prominent among the interviewees.

**Table 5. 43: MSN usage to increase instructional time**

	Colleges					Total (32)	
	FB1 (8)	FB2 (8)	CC1 (8)	BC (4)	SC (4)	Count	%
<b>Reprocessability</b>	0	0	1	0	0	1	3,13%
<b>Multiplicity of connections</b>	3	2	3	0	1	9	28,13%
<b>Intelligent Nodes</b>	8	8	8	1	1	26	81,25%
<b>Currency of connections</b>	5	4	3	3	2	17	53,13%
<b>Total (unique)</b>	8	8	8	3	3	30	93,75%

In summary, data in Table 5.43 suggests that learners always attempt to have strong links with intelligent others.

### **5.28.5 Perception towards MSN**

Using the clustering process (Miles *et al.* (2014), the responses on perception were categorised into ‘benefits’ and ‘no benefits’. Out of 32 respondents, very few learners (n=3) perceived no benefit from MSN usage and as expected, the majority of them were from BC College (BC1-4, BC1-9), while FB2 had only one respondent (FB1-2) sharing the same aspect. One notable comment was from BC2-4, who said “... So it’s not instant support. But I don’t think it will make a huge impact”.

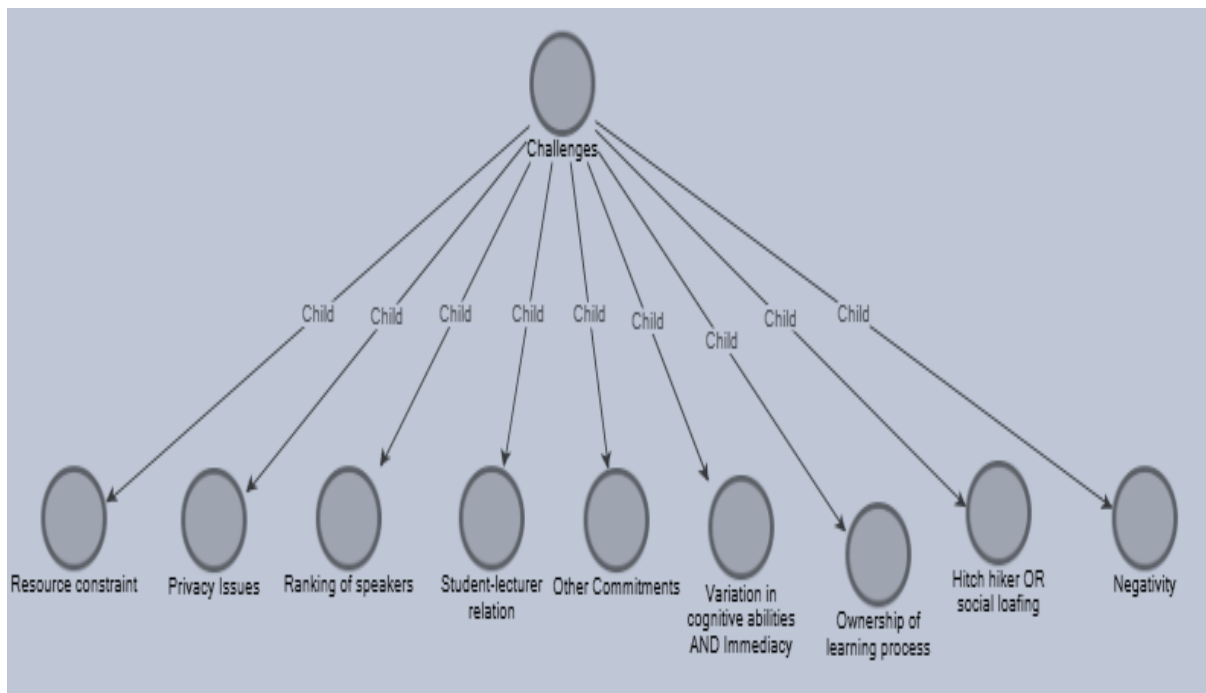
Moving on to the benefits category, a number of aspects emerged and were grouped under: competence, skill, knowledge, ownership of learning process, collective action and freedom, activation of muted voice, learning anywhere anytime, and transforming student to ZPD. The coding references are shown on Table 5.44 with the last column indicating total count and expressed as a percent of the total respondents.

**Table 5. 44: Perceived benefits towards MSN**

	Colleges					Total (32)	
	FB1 (8)	FB2 (8)	CC1 (8)	BC (4)	SC(4)	Count	%
<b>Transform to ZPD</b>	0	1	1	0	1	3	9,38%
<b>Skills</b>	1	1	1	0	0	3	9,38%
<b>Ownership of learning process</b>	0	2	0	0	1	3	9,38%
<b>Knowledge</b>	6	7	3	1	4	21	65,63%
<b>Competence</b>	0	0	2	0	0	2	6,25%
<b>Communication</b>	1	0	3	0	1	5	15,63%
<b>Collective action and freedom</b>	8	8	7	3	4	30	93,75%
<b>Anywhere anytime</b>	0	0	3	0	0	3	9,38%
<b>Activation of muted voices</b>	0	0	1	0	0	1	3,13%
<b>Total (unique)</b>	8	8	8	3	4	31	96,88%

Evidence from Table 5.44 as reflected by the count value (n=30) suggests that more than three-quarters of learners (n=30) perceived WhatsApp as a tool for collective action and also associated with freedom. For instance, CC1-7 said: “ We were discussing something that is common between us and these interesting things that you see might seem OK ...”. Surprisingly, activation of muted voice and learning anywhere anytime were mentioned by very few respondents (n=3, n=3 respectively) from CC College. As shown in Table 5.44, none of the learners from BC and SC perceived skill as a follow-on benefit from WhatsApp usage. Knowledge, a key aspect in learning efficiency in the current study was perceived to have been experienced through the use of WhatsApp by more than half (n=21) of the learners. When asked what they had gained through use of WhatsApp, FB1-2 replied “Definitely knowledge”.

If we turn to challenges identified by the learners, various issues resurfaced. These are shown in Figure 5.35.



**Figure 5. 35: Identified challenges**

One notable observation to emerge from the data was student-lecturer relationship which is fundamental to successful and focused engagement as expressed in response to lecturer-led WhatsApp group. Half of FB2 learners (n=4) raised similar concern. FB2-1 complained: “I would really like for future students since we are the last generation for the lecturer to be more patient ... but I would really like the lecturer to be patient with students and make sure that each student in the class understands what is going on”.

In addition, there was a feeling that some learners had other commitments when they are at home (n=7) and as such could not participate throughout as they would have wanted. Further, resource constraint was highlighted by almost half of the learners (n=14). The issue of resource constraint emerged throughout Phase 1 and Phase 2. Another interesting aspect was variation of cognitive abilities. Only one respondent (FB1-14) cited difference in abilities as a challenge by saying: “The pace at which my fellow students participated. They would react so fast. So before I could even answer or think about the topic they would have answered it”. On the positive side, the sentiment highlighted immediacy in participation within the WhatsApp group. Having identified challenges associated with resolving learning efficiency issues within NCV programmes, the study turned on to seeking suggestions from the learners on what they felt should be done; this is discussed in the subsequent section.

### **5.28.6 Suggested Interventions**

There were a number of suggestions that arose from the learners, and these were cross-tabulated according to each institution in order to see the cross-case impact. It is apparent from the Table 5.45 row 5 that the majority of interviewees (n=28) preferred usage of MSN for other subjects. Although observation reflected that learners from BC were not so active on WhatsApp (see Appendix 12E), Table 5.45 reflected that out of the four respondents interviewed, the majority of them (n=3) were positive about the idea of using it in other subjects. For instance, BC1-1 suggested: “Yaa, for the vocational subjects it would actually work ... We use technology to get everything, so pop-up on our digital devices will make us to be more active”.

Another noteworthy suggestion to emerge from the data was addressing resource constraint issue with more than half of the total respondents (59.38%) highlighting the issue. One of the interviewees, FB2-2, suggested: “I think they should provide us with data. Monthly data”. Also, CC1-3 shared the same sentiments by suggesting: “I think the colleges must supply students with Wi-Fi at school so that they can be able to get on WhatsApp around the campus”. Also of significant interest was that the majority of these learners were from FB2 and CC1 where most of the learners are from areas predominantly associated with economic and social challenges.

Another surprising observation from data was that on lecturer involvement and time-tabling aspects. While a significant number of learners interviewed (37.5%) suggested the importance of lecturer involvement, none of the learners were from BC and SC, yet they were the least active lecturers on the group. As for time-tabling, very few learners suggested that it was an issue, and these were all from CC College. On the account of time-tabling, CC1-15 recommended that: “ I think the colleges in terms of the library, there must be some time that we spend in the library to do our ISAT.....”. Taken together, the interview results provide insights on possible interventions, which could potentially improve learning efficiency.

**Table 5. 45: Suggested interventions sub themes**

Survey Respondent	Colleges					Total (32)	
	FB1 (8)	FB2 (8)	CC1 (8)	BC (4)	SC (4)	Count	%
<b>Worry for the future</b>	1	0	0	0	1	2	6.25%
<b>Variation of content</b>	2	0	0	1	0	3	9.38%
<b>Use in other subjects</b>	7	8	6	3	4	28	87.5%
<b>Time-tabling</b>	0	0	2	0	0	2	6.25%
<b>Lecturer involvement</b>	5	3	4	0	0	12	37.5%
<b>Guest Lecturers</b>	0	0	0	1	0	1	3.13%
<b>Extra classes</b>	0	0	1	0	1	2	6.25%
<b>Addressing resource constraint</b>	2	5	6	3	3	19	59.38%
<b>Total (unique)</b>	8	8	8	4	4	32	100%

Regarding need for framework, various categories were suggested and cross-tabulated per college as shown on Table 5.46.

**Table 5. 46: Need for framework**

	Colleges					
	FB1 (8)	FB2 (8)	CC1 (8)	BC (4)	SC (4)	Total (32)
<b>Chaos</b>	75%	50%	37,5%	100%	50%	59.38%
<b>Communicative freedom</b>	0%	0%	12,5%	0%	0%	3.13%
<b>Focused discussion</b>	100%	100%	87,5%	0%	100%	84.38%
<b>Lack of self—confidence</b>	0%	0%	12,5%	0%	0%	3.13%
<b>Lecturer-led groups</b>	87,5%	87,5%	100%	100%	100%	93.75%
<b>No lecturer groups</b>	12,5%	12,5%	0%	0%	0%	6.25%
<b>Rules</b>	0%	0%	0%	100%	0%	12.5%
<b>Total (unique)</b>	100%	100%	100%	100%	100%	100%

As shown in Table 5.46, most of the 32 learners (93.75%) suggested that they preferred lecturer-led groups in comparison to non-lecturer-led groups (6.25%). Focused discussion (84.38%) emerged as a recurrent theme from the interviewees. Comparing the two results (focused discussion and lecturer-led groups), it is clear that most participants (n=25) occurred in both cases suggesting a relationship between lecturer-led groups and focused discussion. Connection can be seen from what respondents said, for instance CC1-5 claimed, “With students on WhatsApp groups, they tend to be silly questions or people are [like] talking about someone who is already in the group trying to make someone like (bullying). So when there is a lecturer, learners tend to withdraw themselves from posting things that are not related to the subject”. Another association was reflected by sentiments shared by SC1-7 who said that “The difference is the rules. On our (group) sometimes it will be gossip all the time or whole day and not talking about programming or Maths. That day will be like gossiping”. In the context of need for

framework, communicative freedom and lack of self-confidence were the least supported (3.13%). The majority of learners (59.38%) suggested that absence of rules and lecturer in WhatsApp groups leads to chaos. Absence of rules and lecturer from WhatsApp group was suggested to lead to chaos. For example, FB2-2 echoed that “There is going to be chaos”. The same sentiments were reiterated by FB1-2 who said: “If it were not for the rules, I would say it could have been very untidy”.

## 5.29 Analysis of quantitative data

This section provides analysis on attendance and Internal examination scores. Further, a comparative analysis on overall performance is also shown using the different statistical measures. Internal exam score contributes 30% of the year mark and this goes to show its importance to the final result. Section 5.30 provides analysis of the Internal Examination scores.

## 5.30 Analysis of Internal Exam Mark

As part of NCV ICASS, an internal examination mark is administered in Term 3 and a common paper is written across colleges in the Western Cape. Results from the internal examination are presented in the current section. First an overview is given and then followed by case analysis. Summary statistics of total number of learners (N=89) whose marks were analysed is presented on Table 5.47 reflects a relatively low performance (mean=56.42, see row 3; Mdn=58, see row 4). The data was left skewed (skew= -.963) meaning that there were more values less than the sample mean. Moving on variation, though a slightly smaller standard deviation (SD= 19.89% see row 6), a relatively larger interquartile range of 22.25% (see row 8) suggests a much higher spread with left skew and potential outliers. For the mentioned reason, a boxplot was then used to illustrate the variation.

**Table 5. 47: Internal Examination summary statistics**

<b>Internal Exam Summary statistics</b>	
Number of learners	89
Mean	<b>56.42</b>
Median	<b>58.00</b>
Std. Deviation	19.890
Skewness	<b>-0,963</b>
Maximum	94
Interquartile Range	22.25

Figure 5.36 presents a boxplot for combined internal examination score for all colleges who took part in this study. As reflected from the Figure 5.36, there were four outliers shown by a

small circle, all with very low mark (0%) suggesting probably that these were learners who missed the exam. It is apparent from Figure 5.36 that at least 75% of the learners obtained a score of approximately 48% or more. The size of the box is fairly large, suggesting a big spread of data (IQR =22.25).; 71.9% of the total sample (N=89) whose results were analysed achieved a pass mark of 50% or more. Overall, these findings support interview data and provide important insight on competence, one of the key variables of learning efficiency.

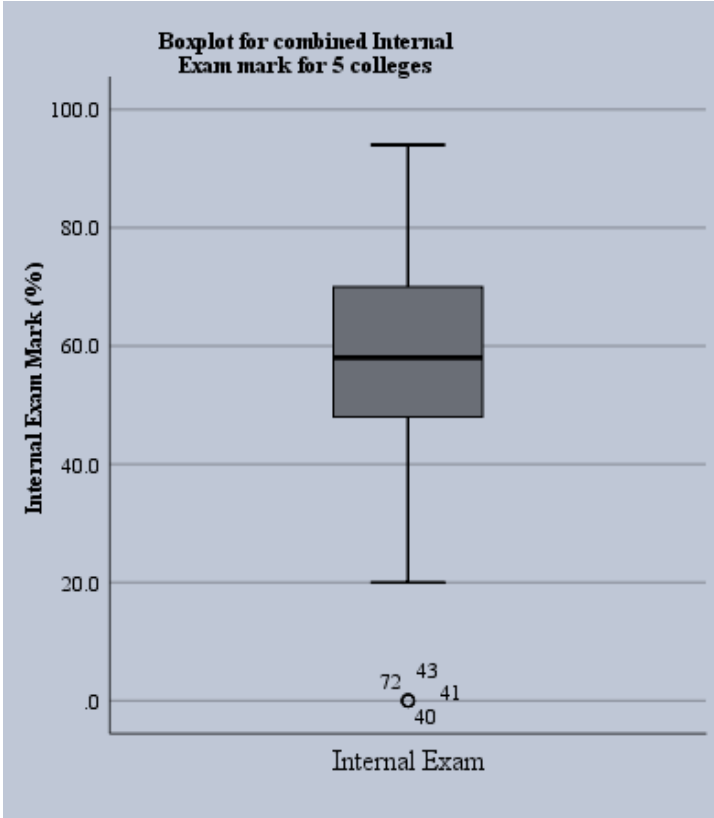


Figure 5. 36: Boxplot to show combined Internal Exam results for the five colleges

A summary of individual cases is shown in the Table 5.48.

**Table 5. 48: Statistical analysis of internal exam shown per college**

	Colleges				
	FB1	FB2	CC	SC	BC
Number of learners	20	28	19	10	12
Mean	49.90	51.32	75.32	58.40	47.63
Median	<b>56.50</b>	<b>55.50</b>	<b>75.50</b>	<b>55.50</b>	<b>48.50</b>
Std. Deviation	25.252	17.164	8.474	16.764	12.034
Skewness	-1.003	-1.161	-1.116	-0.140	-0.682
Interquartile range	17.25	19.75	9.50	23.75	12.88

Statistics in Table 5.48 indicates relative similar measures of central tendency for FB1, FB2 and BC (as reflected in row 4 for mean and row 5 for median values) with all data for the five colleges left skewed. The researcher, therefore used boxplots (refer to Figure 5.37) to show spread and potential outliers in the distributions; this is reflected in Figure 5.37. As mentioned earlier, three colleges (FB1, FB2 and SC) had relatively a similar measure of central tendency. However, the spread tells a different story, possibly because of outliers. The interquartile ranges for FB2 and SC were consistently high (IQR= 17.25; 19.75) as reflected by the size of the boxplot. Although SC seem to be right-skewed as seen by upper 50% of distribution, the lower whisker is longer than the upper whisker.

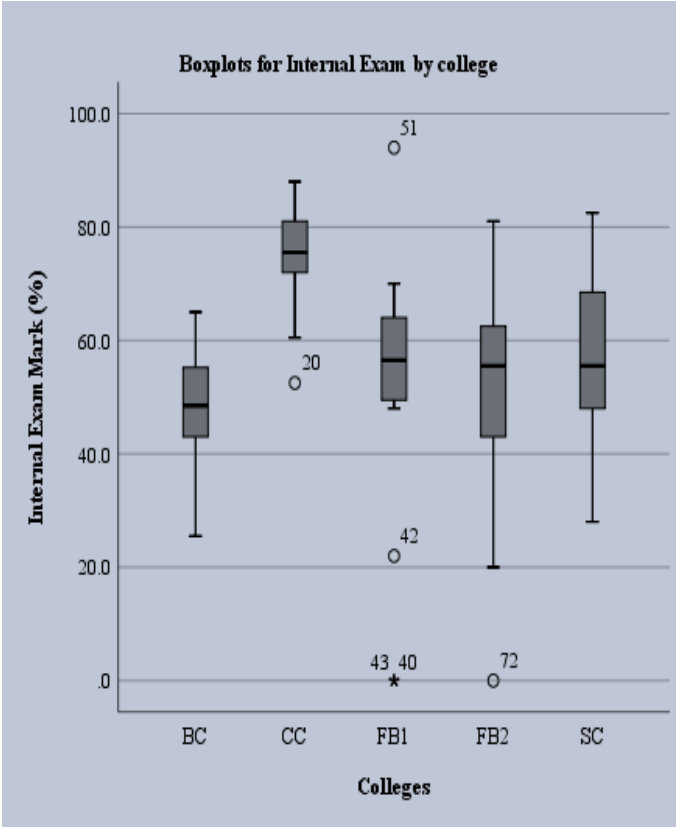


Figure 5. 37: Internal Examination distribution per college

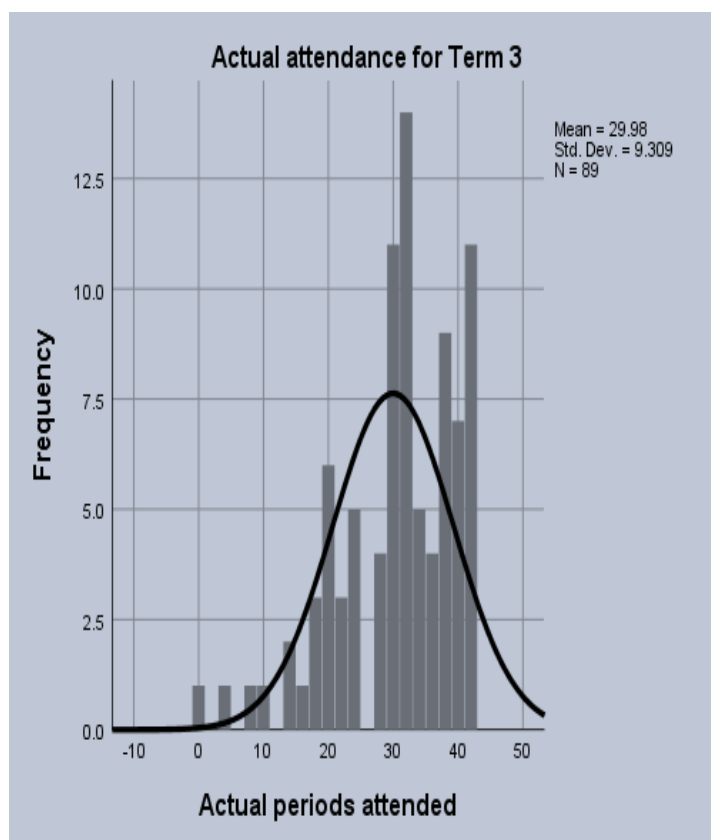
### 5.31 Analysis of Term 3 attendance

One of the fundamental reasons behind analysing attendance in all terms was to confirm existence of instructional time loss throughout the year. There was a tremendous improvement in time lost across colleges, with the exception of FB1 where number of periods not accounted for at college level were considerably high (n=6), as shown in Table 5.49 row 3. SC, BC and CC attendance improved significantly in comparison to attendance for term 1.

**Table 5. 49: Term 3 attendance**

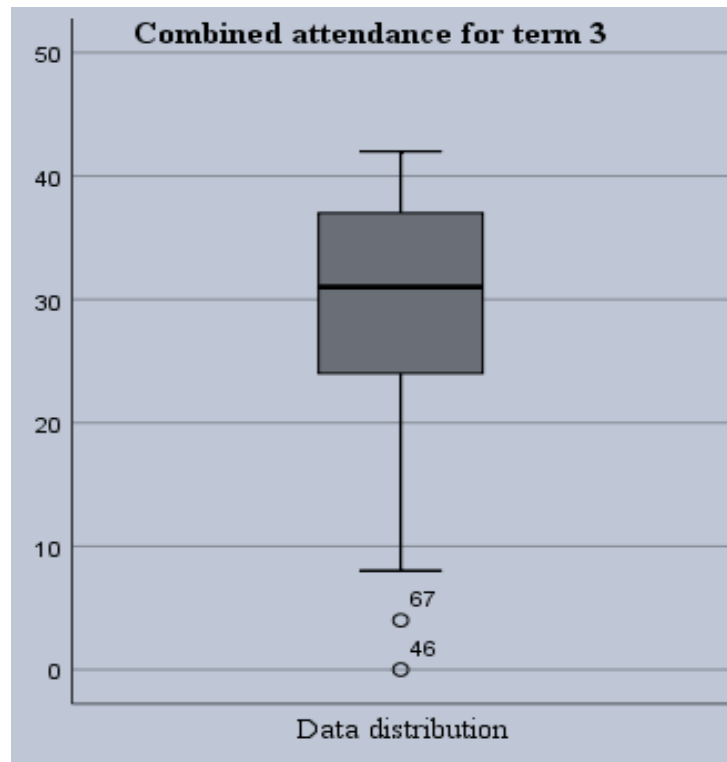
College	College actual periods	DHET Calendar periods	Periods short
CC	43	43	00
FB1	25	31	06
FB2	32	33	01
BC	40	40	00
SC	43	43	00

Moving on to individual attendance, an analysis of registers reflected mixed findings for attendance at individual level, and these were presented on a histogram as shown in Figure 5.38. As shown in Figure 5.38, the measure of central tendency indicated a moderately high attendance (Mean=29.98, *Mdn*=31 periods (not shown)). The highest attendance was 42 periods, with a shockingly low attendance of 0 periods attended causing a very high range (range = 42 periods). However, since the graph indicated a left skew suggesting that the distribution was not normal and a very high range, there was potential of outliers from the data. Following the graph, boxplots were used to depict variation. While figures reflected next to the graph suggest a considerably moderate variation, this was not adequate because the data was not normal.



**Figure 5. 38: Histogram showing attendance for all learners**

As shown in Figure 5.39, there was a high variation (IQR (approximately 16) and two outliers shown below the lower whisker, and surprisingly, all of them were from FB2. More than 50% of the sample had considerably high attendance ( $Mdn=31$ ).



**Figure 5. 39: Combined attendance for Term 3**

While the average number of periods (Mean= 7.58) missed looks low, it can be argued that missing such a number of lessons can be detrimental to performance as a good deal of work can be covered within that time.

### **5.32 Association between Term 3 attendance and Internal Examination mark**

Data for term 3 attendance and internal exam mark were tested for association using Spearman's rank correlation. Results indicated a positive weak correlation ( $r_s [89] = .342, p$  (2-tailed=0.01)). The association was significant at a 10% level of significance (that is to say,  $p < 0.01$ ). Summary results for individual colleges were then drawn from SPSS and presented in Table 5.50. As reflected, FB1 results shown in row 4 indicated a moderate positive correlation and was statistically significant at 5% ( $(r_s [20] = .479, p$  (2-tailed=.033)). Another result which indicated a moderate positive correlation was from FB2 ( $(r_s [28] = .620, p$  (2-tailed=0.607)) at 10% significance. For the other three colleges, there was no association between attendance and internal exam mark.

**Table 5. 50: Correlation analysis between Term 3 attendance and test scores**

College	Sample size	Correlation Coefficient	p Value	Comment
SC	10	.151	.678	Not statistically significant
BC	12	.356	.256	Not statistically significant
FB1	20	.479*	.033	statistically significant
FB2	28	.620**	.000	statistically significant
CC	19	.126	.607	Not statistically significant

\*Correlation significant at 0.05 level

\*\*Correlation significant at 0.01 level

### 5.33 Comparative analysis of Theory Test 1, 2 and Internal exam marks

In this section, the researcher explored learner performance over the three Phases for each college to check for consistent progression or retrogression of performance in theory mark per college from Term1 to Term 3. Combined data for theory marks was again tested for normality using a more robust test called the Shapiro-Wilk test (Yap & Sim, 2011). Data was extracted from SPSS and *p*-value was less than .05, suggesting that scores were not distributed as normal ( $p < 0.05$ ). Given that MSN was effected after Test 2, the assumption was that performance would have increased in ISAT and Internal Examination after introduction of WhatsApp. Combined data for all the three theory tests were loaded in SPSS and output shown using boxplots (see Figure 5.40). Progressive improvements were experienced at CC College from Term 1 to Term 3 as seen by the median value of all the respective boxplots in Figure 5.40.. However, test scores at BC decreased progressively from Term 1 to Term 3. The results for the remaining three colleges were mixed (see Figure 5.40).

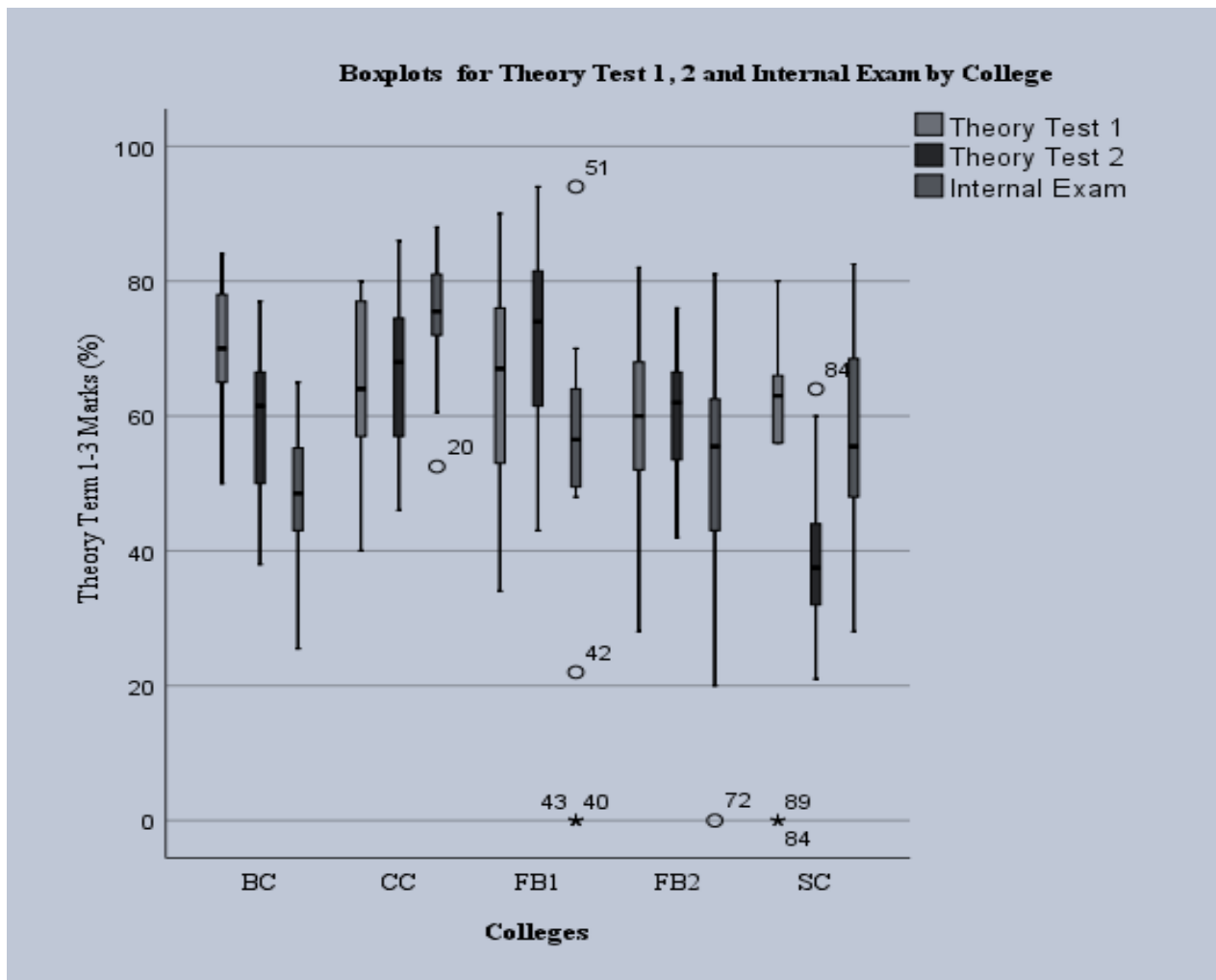
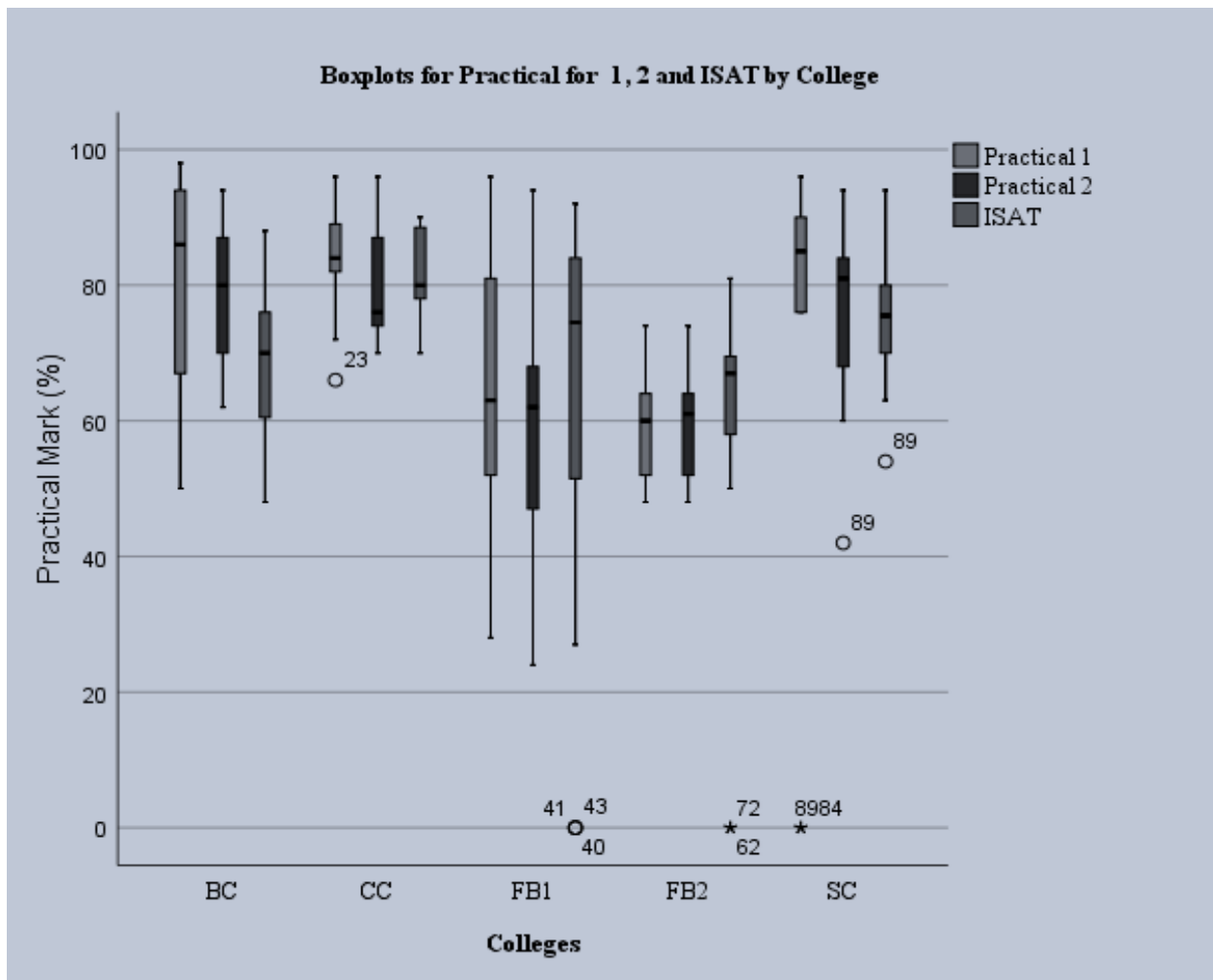


Figure 5. 40: Comparative analysis for theory marks

### 5.34 Comparative analysis of Practical Test 1, 2 and ISAT marks

Practicals 1 and 2 and ISAT scores were analysed per college to see if there were changes in performance. The final analysis is shown using boxplots in Figure 5.41. Just as in theory, it is interesting to note that performance for BC learners progressively decreased from Term 1 to Term 3. On the contrast, performance for FB2 gradually increased (see Figure 5.41).



**Figure 5. 41: Comparative analysis of practical marks**

### 5.35 Comparative analysis of attendance

A comparative summary of number of periods missed at each college was then drawn up and presented using boxplots for the three terms as shown in Figure 5.42. It is apparent that SC College appears to be leading in number of periods lost throughout the three terms. While CC had a very high number of periods lost in Term 1, the number dropped significantly in Term 2 and 3 as seen by the spread on boxplots (see Figure 5.42).

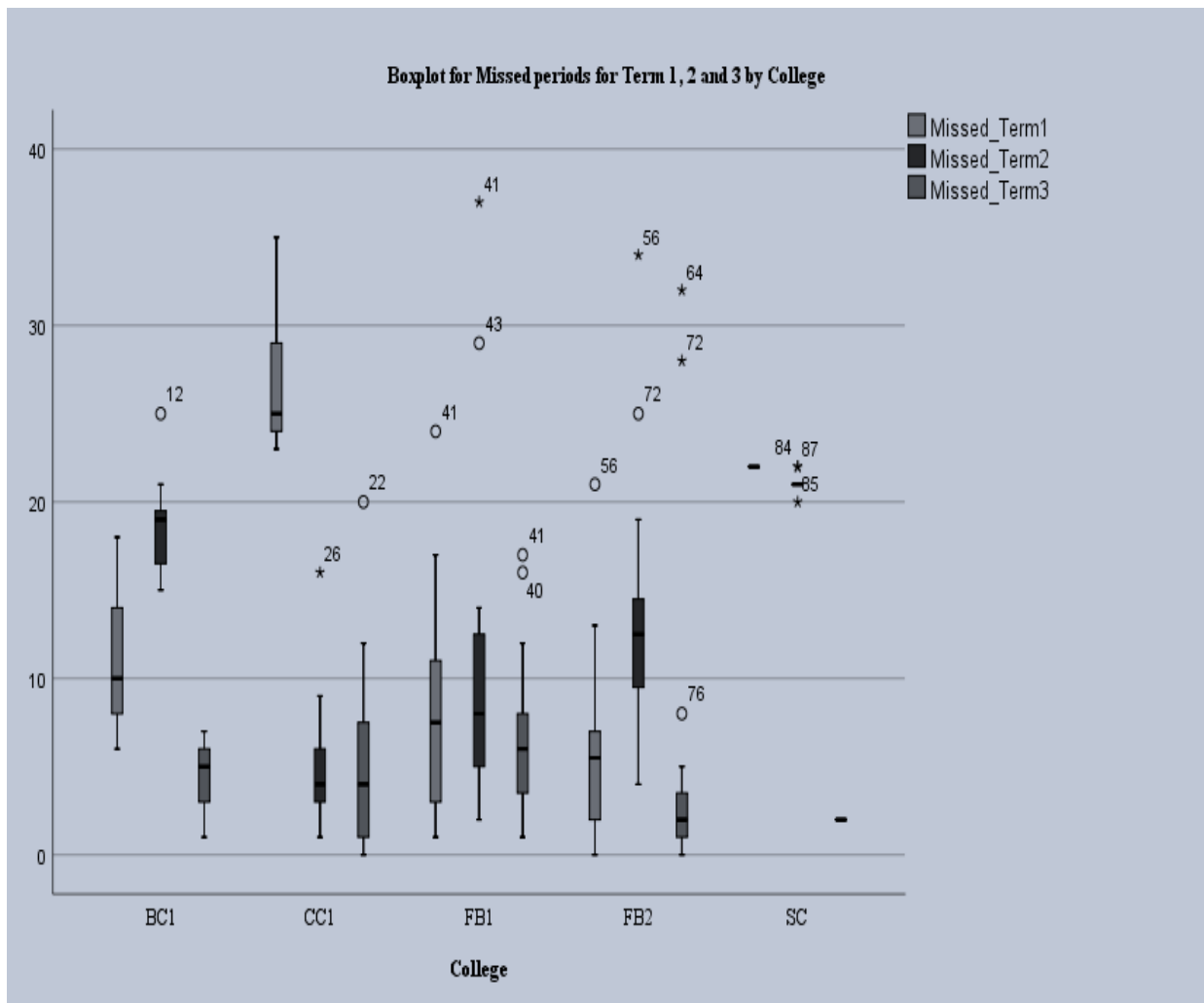


Figure 5. 42: Comparative number of periods missed per college in three terms

### 5.36 Repeated measures for the different groups in theory tests

While data on test scores reflected mixed conclusions, it was vital to determine further if there was a statistically significant difference between the assessments administered before and after WhatsApp intervention. The researcher considered a test for repeated measurement for the three theory assessments (Theory Test 1 and 2 and Internal examination marks). One option was to use one-way analysis of variance (ANOVA) for repeated measures. However, data violated normality testing and as such, he employed the Friedman test, which is a non-parametric alternative to one-way ANOVA. In the current context, the Friedman test was used to check if results from the three terms were significantly different from each other, and if so, to identify which assessments had a significant statistical difference. Table 5.51 presents an overall summary from SPSS for the three tests for all the colleges. Since the p-value was greater than 0.05 (N=89; p=.143; W=.22), it can be concluded that there was no significant statistical

difference in performance for learners in performance for Theory Test 1 and 2 and Internal examination, even after extending instructional time using WhatsApp.

**Table 5. 51: Combined Theory Statistics using Friedman Anova and Kendall Coefficient of Concordance**

	Anova Chi Sqr. (N =89, df =2) =3.891; Kendal W=.22; Asymp. Sig =.143 ( <b>p-value &gt;.05; retain null hypothesis</b> )		
<b>Variable</b>	<b>Mean ranks</b>	<b>Std Deviation</b>	<b>Mean</b>
Theory Test 1	2.10	15.894	62.18
Theory Test 2	2.07	14.613	61.60
Internal Exam	1.83	19.8902	56.421

Similar tests were run per college for Theory Test 1 and 2 and internal examination per college; results of the *p*-value are reflected in Table 5.52 column 3 with the conclusion shown in column 4. Column 5 provides the tests where difference was of statistical significance. Four colleges showed significant statistical difference (BC, SC, FB1 and CC). For instance, there was significant difference in performance for all learners at BC for their Theory Test 1, Test 2 and Internal Exam (N=12; *p*=.000; W=.840). Further, there was some statistically significant difference between each of the tests, as shown in Table 5.53 column 5. Only FB2 did not have significant statistical differences from Theory Test 1 and Internal Exam.

**Table 5. 52: Combined summary results on tests differences in Theory Test 1 to Internal exam using Friedman test**

College	Sample size (N)	Friedman <i>p</i> -value	Conclusion	Terms with statistical significant difference & <i>p</i> -value
BC	12	.000	Statistically significant difference	Test 1–Test 2 ( <i>p</i> =.025) Test 1-Internal Exam( <i>p</i> =.000) Test 2-Internal Exam( <i>p</i> =.025)
SC	10	.025	Statistically significant difference	Test 1–Test 2 ( <i>p</i> =.025) Test 2-Internal Exam( <i>p</i> =.014)
FB1	20	.001	Statistically significant difference	Test 2-Internal Exam( <i>p</i> =.000) Test 1–Test 2 ( <i>p</i> =.048)
FB2	28	.156	Not statistically significant different	No differences
CC	19	.008	Statistically significant difference	Test 1-Internal Exam( <i>p</i> =.006) Test 2-Internal Exam( <i>p</i> =.009)

Similar tests were done for the practical exams and results are presented in the subsequent section.

### 5.37 Repeated measures for the different groups in practical tests

Just like the results for combined theory, Table 5.53 reflects no significant statistical differences in performance for learners after extending instructional time because of the *p*-value greater than .05 (N=89; *p*=.145; W=.22).

**Table 5. 53: Combined Practical Statistics using Friedman Anova and Kendall Coefficient of Concordance**

Anova Chi Sqr. (N =89, df =2) =3.865; Kendal W=.22; Asymp. Sig =.145 ( <i>p</i> -value >.05; retain null hypothesis)			
Variable	Mean ranks	Std. Deviation	Mean
Practical Test 1	2.12	19.695	69.57
Practical Test 2	1.85	15.790	68.36
ISAT	2.03	20.790	68.00

Results were further analysed per college to check for significant statistical difference in practical tests (see Table 5.54). The statistical difference in practical marks for learners after extending instructional time at two colleges (BC and FB2) was significant. as shown in column 2 since the *p*-value was less than .05, for instance, FB2 (N=28; *p*=.001; W=.258). Significant statistical difference was observed in ISAT-Practical 2 (*p*=.008) and ISAT-Practical 1 (*p*=.003). For detailed Friedman test results per college refer to Appendix 8.

**Table 5. 54: Combined summary results on tests differences in Practical Test 1 to ISAT using Friedman test**

College	Sample size (N)	Friedman <i>p</i> -value	Conclusion	Terms with statistical significant difference & <i>p</i> -value
BC	12	.002	Statistically significant difference	ISAT-Practical2 ( <i>p</i> =.041) ISAT-Practical 1( <i>p</i> =.001)
SC	10	.283	Not statistically significant different	No significant differences between all practical tests
FB1	20	.845	Not statistically significant different	No significant differences between all practical tests
FB2	28	.001	Statistically significant difference	ISAT-Practical2 ( <i>p</i> =.008) ISAT-Practical 1( <i>p</i> =.003)
CC	19	.183	Not statistically significant different	No differences

Detailed statistical results for repeated measures for theory and practical tests are presented in Appendix 8.

### 5.39 Summary of November Final Year Performance

To gain an understanding of competence, final results were summarised in Table 5.55. As reflected in column 5, FB1 and BC had 100% pass rate. CC had the lowest pass (37%) rate. An undocumented claim was made that on the day when learners sat for their practical paper, there was load- shedding at CC College for close to four hours. Learners had to sit in the exam room for all the time only to continue after the long wait. Individual marks for learners were not analysed since the final exam mark also included the ICASS mark and ISAT mark. However, results were sufficient to discuss performance at campus level.

**Table 5. 55: Final November Exam results**

		<b>Number wrote</b>	<b>Passed</b>	<b>%Pass</b>
<b>Colleges</b>	FB1	15	15	100
	FB2	25	14	56
	CC	19	7	37
	SC	10	9	90
	BC	9	9	100

Overall, from the total number of learners who sat for the final examination (N=78), 69.2% (n=54) passed suggesting that these were the learners who were regarded as skilled, knowledgeable and competent.

#### **5.40 Reliability in the study**

This section discusses reliability of the instruments used in the study.

##### **5.40.1 Reliability of the Questionnaire**

A total of 16 closed-ended questions from the learner questionnaire underwent testing for internal consistency using Cronbach's Alpha. According to Bryman (2008), an alpha coefficient greater than .80 is quite acceptable. The Cronbach's alpha test result from SPSS was at .924, suggesting that the instrument was reliable. The same test was repeated using a split model and the two halves showed .736 and .958, with the first part having 38 items and the second having 37 items.

##### **5.40.2 Reliability of the interviews**

Lecturer interviews and learner interview audio tapes were transcribed verbatim by the researcher. The transcription process also helped the researcher to familiarise himself with data (Braun & Clarke, 2006) and to sense latent themes (Boyatzis, 1998). The coding scheme followed was consistent with research questions and literature. Since employing multiple coders may involve some costs, the researcher avoided the technique. However, he constantly shared their coding results with their mentor. Moreover, qualitative analysis seeks depth which can only be achieved by the researcher. Subjectivity can be a challenge in cases where there is more than one coder (Campbell, Quincy, Osserman & Pedersen, 2013). During the coding process, the researcher could refer to some actions noticed on WhatsApp group or moods witnessed when he visited each campus.

### **5.40.3 Reliability of the documents**

In the current study, the researcher analysed test scores and learner attendance using data extracted from official college registers recorded by the lecturers. Records from four colleges were extracted from the ITS system which is used by most TVET colleges. Information on attendance and test scores was then transferred into *excel* for analysis. The quality of documents used was judged using four criteria as set out by Scott (1990): authenticity, credibility, representativeness and meaning. The documents obtained were authentic because they were recorded by the lecturers according to college standards and stored in ITS (FB1, FB2, BC, CC). At SC, the lecturer used an *excel* spreadsheet for storing attendance. In terms of credibility, the researcher analysed attendance using college dates and then compared this with the DHET calendar. All documents collected were “clear and comprehensible” (Bryman, 2008:516). The documents used were convenient and thoughtfully prepared by the respondents (Creswell, 2009), who in this study were the lecturers. The following section summarises the current chapter.

### **5.41 Summary**

The present chapter provided analysis of lecturer interviews, learner questionnaires, test scores and attendance, learner interviews and some observations. The findings suggest the need to extend instructional time, which requires awareness of the construct first. The discussion presented showed how the learner—lecturer aspect facilitates successful collaboration, consequently leading to focused discussion. Repeated occurrences of themes at each stage as reflected, indicated that analysis was exhausted and reached point of saturation as in grounded theory coding. Statistical data indicated that instructional time loss is a reality and needs proper monitoring for pedagogical optimisation. Statistical analysis provided mixed conclusions. While there was association between instructional time and learning efficiency, the findings cannot be used to claim causation. Last but not least, findings signposted some challenges such as resource constraint to be major factors which potentially negate effectiveness of MSN in communities synonymous with social and economic challenges. Chapter Six presents a theoretical elaboration together with the revised integrated MSN framework.

## CHAPTER SIX: THEORETICAL ELABORATION

### 6.0 Introduction

Within the context of the current study, theoretical elaboration was used to explain why identified conceptual constructs were used in guiding the study. Using the identified constructs set out in Chapter Three, a preliminary framework was designed which then guided the research design. In line with abduction, theoretical elaboration provides insights into how constructs are linked and their fit in the research setting. Theoretical elaboration was defined by Fisher and Aguinis (2017:441) as:

The process of conceptualizing and executing empirical research using pre-existing conceptual ideas or a preliminary model as a basis for developing new theoretical insights by contrasting, specifying, or structuring theoretical constructs and relations to account for and explain empirical observations.

While theoretical elaboration has been associated with research which starts with theory, the researcher upholds an abductive approach in the current study to assist in making intelligent guesses. In Chapter Three, a brief explanation was given of the need for a framework from the concepts. In the current chapter, the focus is on aligning the constructs and restructuring (Fisher & Aguinis, 2017) them according to the findings. The understanding is expected to extend knowledge on instructional time and MSN usage for learning efficiency purposes.

Instructional time issues can potentially cause worrisome effects such as learning efficiency problems to both learners and lecturers and to policy makers. While there have been several studies on instructional time over an extensive period (Bloom, 1974; Abadzi, 2007; Duncheon & Tierney, 2013), the concept has not been consistently developed and now appears to have lost its strength in the academic mainstream. Despite the emergence of MSN use within the learning environments, there have not been studies to link instructional time, MSN affordances, learning efficiency and the lecturer-learner aspect. As a consequence, this study seeks to elaborate the theories of FRAME analysis (Koole, 2009) and ZPD (Vygotsky, 1978) together with aspects of connectivist. While having employed some of the concepts from the mentioned theories, the researcher wished to highlight that the current study research question was never tightly scoped from the associated theories. Instead, conjectures arose from years of practical observations and experience within the NCV community. After a three-phase iterative process of data collection followed by analysis, six propositions were scoped from empirical assertions. The suggested propositions were tested deductively against all the data “as part of logic of

knowledge” (Popper, 2002:3). Subsequent to the discussion on propositions, the researcher then presented a revised integrated MSN framework that was introduced in Chapter Three.

## 6.1 Instructional time awareness

Awareness of instructional time is defined as the degree of attentiveness or the mindfulness of the instructional time concept by the lecturer and the learners. One of the key aspects in Phase 1 was to check whether lecturers were conscious on the instructional time concept. Evidence obtained was alarming sparse. Table 6.1 provides key excerpts from four lecturers’ responses when asked about the number of hours allocated for Computer Programming per year:

**Table 6. 1: Lecturer extracts on awareness of instructional time**

Lecturer	Comments
LSC01	I am not sure as to how many number of hours are required as per syllabus.
LFC1GM	Honestly, I did not know that information.
LBC1FV	That’s a very difficult question. No, I don’t know that.
LFC1WM	“120 hours, I mean.” (Incorrect)

As indicated in the extracts above, lecturer awareness was not convincing. While they knew the number of periods allocated for the subject per week, none of them knew the exact number of hours allocated for the subject per year. Based on the evidence from the extracts, it was apparent that awareness was very minimal. Surprisingly, LSC01 mentioned that he was a member of the college timetable committee where mastery in subject policy documents is a key requirement for purposes of drawing up timetables. Any initiative for pedagogical optimisation requires significant awareness of instructional time (Duncheon & Tierney, 2013) to be spent on each subject. While some studies (Lomax & Cooley, 1979; Fredrick & Walberg, 1980; Baker, Fabrega, Galindo, & Mishook, 2004) did not find any correlation between time and achievement, other researchers (Gandara, 2000; Rivkin & Schiman, 2015) instead highlight a connection which corroborates findings of the current study. While LSC01 was the only lecturer who did not participate on the WhatsApp group, because of privacy issues, he was instrumental in encouraging his learners to take part. It is within this context that the researcher proposed and refined Proposition 1 as:

**P1: If lecturers and learners are aware of instructional time requirements, they are more likely to engage MSN platforms for extending learning beyond the classroom.**

It seems clear that lecturer awareness was not present in Phase 1 but improved in Phase 2 and 3. Given that awareness was positive in Phase 2 and 3 (66% of the project), the researcher concluded that the empirical patterns match those concluded in Proposition 1 and as such, Proposition 1 passes the empirical check. Proposition 1 is closely connected to the second proposition (P2) since any initiatives for educational improvement require awareness of instructional time more importantly from the lecturers.

## **6.2 Focused discussion**

Focused discussion is defined in the current context as collaboration guarded from different forms of chaos facilitated by the lecturer. Given that MSN has the potential to provide learning at different times, Traxler (2010) suggests that this can result in disjointed knowledge. Nonetheless, lecturers play an integral role in moderating discussions within the WhatsApp platform. In the early stages of Phase 1, there were mixed reactions from LBC1FV who saw the use of WhatsApp as conflicting with his portfolio of rolling out Moodle for the college. In his personal email to the researcher, he exclaimed:

“Please see here some of my e-learning implementation and activities that (learners) are required and instructed to use ... Communications by means of a forum which also gets sent to their college email address is done, but few learners check this out.” As such, it never set a good tone for BC learners and their participation was relatively low throughout the study. While he later tried to encourage the learners, as in Figure 5.9, learners appeared to have seen the platform as not important.

Based on the evidence of contributions from other colleges, it is clear that student and lecturer participation was strong. In the researcher’s observation, although SC lecturer did not join the group, the learners from that college did not feel his absence due to the confidence they had in the researcher as he doubled duties (both as lecturer and as researcher). Their participation was above board. What was apparent, however, was the support given by LCSC01 in all cases as he would always check what they were discussing on WhatsApp. Further, looking at the interviews conducted in Phase 3, the majority of the respondents (84.38%) suggested that lecturer presence on the WhatsApp group led to focused discussions.

Although FRAME analysis (Koole, 2009) had learner aspect, social aspect and device aspect, lecturer presence remained unaccounted for. Garrison *et al.* (1999) highlighted learner and teacher presence in the educational process. Along the same lines, researchers Tagg and

Dickinson (1995) suggest that students' activities are influenced by tutors' behaviour. Moreover, lecturer presence provides solid support for focused discussions geared to extending instructional time and possibly improving learner efficiency, particularly within NCV. On the provided account, Proposition 2 (P2) suggests an alternative which lecturers or college authorities and policy makers should advocate for in their effort to extend instructional time through MSN platforms such as WhatsApp. The proposition reads:

**P2: If there is strong lecturer and strong learner presence, then MSN usage for extending instructional time can be successful.**

Premises of the current proposition have been well supported from literature and empirical setting. A decision table has been attached to confirm proposition validity (see Appendix 9 A).

### **6.3 Negotiated Contact style**

Negotiated contact style is discussed in the current study as a point of intersection between the lecturer's and learner's preferred choice of contact style. Results from the empirical situation reflected distinct choices of contact styles. The researcher customised Bentley's (2002) contact styles to suit the different contact styles which could potentially be seen as suitable for adoption by lecturers and learners. Confluence and retroflexion contact styles were the preferred choice of contact styles from the lecturers (see Table 5.9). Results from Phase2 and Phase 3 suggested that learners preferred deflecting contact style as it led to focused discussion.

The proposition was initially put forward as:

**P3: When there is a perceived match between lecturer contact style and student contact style, participation on MSN platform is more likely to be high.**

The premises of the above proposition made it likely plausible, but disparities appeared after testing it from the dataset (see Appendix 9 B). The researcher used lecturers' results from Phase 1 and r from Phase 3 of the interviews. Proposition P3 was therefore falsified ( $\neg$ P3) and the final proposition reads:

**P3: When there is no perceived match between lecturer contact style and student contact style, participation on MSN platform may still be high.**

Further to this, while the proposition was falsified, the study still upholds the suggestion that contact styles during face-to-face classes possibly had added influences in reaching a neutral

ground to increase motivation and subsequently participation. Section 6.4 discusses the need for an integrated MSN framework in learning.

#### 6.4 Using an integrated MSN framework to guide role players

The proposition which resulted from research sub-question 4 is presented as:

**P4: MSN usage for extending instructional time can be successful only if there is a guiding framework for the lecturers.**

In the current study, a framework is explained in terms of a guided structure which practitioners or policy makers use when implementing an initiative. The structure provides guidelines through which an initiative is implemented and evaluated. Results from lecturer interviews suggested the need for a framework if adoption and success of MSN platforms such as WhatsApp are to be realised. For instance, LFC1WM appeared worried about the success of the project and its adoption, citing contradiction between college initiatives and college policy as one of the challenges when he said:

It's to recognise them (MSN). It's to recognise that there are tools that can be used in the classroom. Like for us the college policy says no cellphones in the classroom. So which means the college policy does not allow the students to use their cellphones. [LFC1WM]

The other four lecturers interviewed shared different sentiments but all pointing towards support of an integrated framework as shown in Figure 6.1, extracted from interview response.

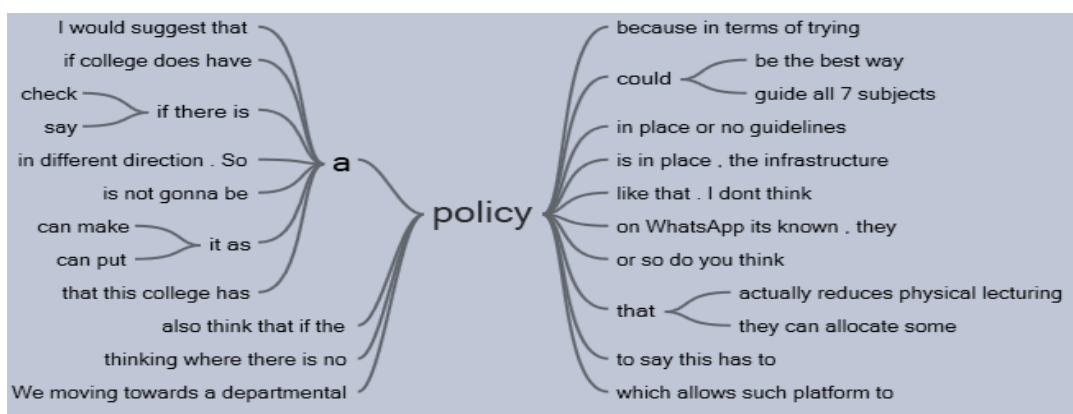


Figure 6. 1: Word tree on key lecturer extracts on policy

Other results from Phase 2 intertwined in student responses regarding rules by lecturers on WhatsApp group validate the proposition. In Phase 3, majority of learners suggested that WhatsApp groups devoid of lecturers would result in chaos. In their work on frameworks,

researchers such as Laurillard (2002), Koole (2009), and Park (2011) suggested the need for frameworks in learning environments when using technology. To summarise, based on evidence from Phase 1 and Phase 3, it is concluded that successful implementation of MSN requires a guiding framework. Proposition 4 is well supported in literature and by the findings of this research study. Section 6.5 presents Proposition 5, related to improve learning efficiency.

## **6.5 Improved learning efficiency**

Improved learning efficiency is explained in the context of improvements in skill, knowledge and competence. Learners in Phase 2 and 3 suggested that extending instructional time was important in addressing their challenges related to learning efficiency. Test scores for all assessments showed mixed conclusions. The proposition which resulted from the main research question was drafted in Chapter 4 as:

**P5: When awareness of instructional time among learners and lecturers is high and institutional support within and beyond colleges is high, learning efficiency will be high.**

This study concludes that while extending instructional time is required, it is not adequate for learning efficiency. Although qualitative data suggested that learners improved in learning efficiency as a result of extending instructional time; statistical data analysed provided mixed results on performance (see Appendix 8). However, the researcher suggests extending instructional time beyond the classes as a complimentary process to what happens within the formal learning space. As presented on the proposed Integrated MSN framework, arrow A1 (see Figure 6.2) provides evidence to point to other factors possibly assisting in explaining the powers of extending instructional time besides interaction of identified processes such as awareness of instructional time (P1), learner—lecturer aspect (P2), negotiated contact style (P3), MSN affordances (P4), and integrated MSN framework for learning efficiency (P5). Using data from Table 5.55, the researcher suggests that the proposition was supported since the number of learners who sat for the final examination and passed, surpassed the national pass rate for the subject. Statistics suggest that learners performed better in four colleges (FB1, BC, SC, FB2), which equates to 80% of the cases in comparison to national statistics and those of the year 2017 (as suggested by the respective lecturers).

Using abductive arguments from researchers on strength of propositions or hypothesis (Popper 2002; Ngwenyama, 2014), the researcher suggests that the current study offered abductive argument with plausible solutions to the problem under study on the following three accounts:

- The propositions generated (P1, P2, P3, P4 and P5) rose from distinct observations and were related to the empirical data
- The connected propositions helped us to predict learning efficiency (though not well supported for CC College)
- Other propositions, for instance P2, passed some empirical tests, suggesting their potential to offer positive predictions.

Based on the above information, this research study has tried offering a better explanation from the empirical setting, given the background interventions which were carried out at the five colleges using WhatsApp. The study experienced both stages of inferences (abduction, deduction and induction) which in itself, it is suggested by the researcher, provided a solution to problems of demarcation (Chalmers, 1999) associated with abduction. Abstract understanding of the problem was negotiated through abduction (pattern identification); testing of propositions was deduction, and testing and induction offered some generalisation since the data was collected from multiple cases. The propositions developed in this study met the following four requirements of propositions as suggested by researchers (Popper, 2002; Lee, 1991):

- Logical consistency: Figure 6.2 demonstrates the logical connection between P1 to P5. Implementation of intervention platforms must begin with an awareness of instructional time concept in order to address learning efficiency issues.
- Falsifiability: As suggested by Popper (2002) regarding truth, proposition 3 was falsified during deductive testing after failing to match the premise and the outcome.
- Relative explanatory power (Lee, 1991:347): Multiplicity of cases. The propositions not only can explain but also predict learning efficiency through extending instructional time using interventions such as MSN.
- Survival: This deals with how proposed theory can survive from their opposing theory. Within the context of this study, it is expected that these propositions can survive challenges from theories of FRAME based on context and extendibility of the lecturer aspect.

While aiming to meet the four suggested criteria, Whetten’s (1989) criterion fits in the developed integrated MSN framework and the propositions as presented in Table 6.2.

**Table 6. 2: Propositional criterion**

<b>Criteria</b>	<b>Explanation</b>
What	Key factors (concepts) included where instructional time, learner-lecturer, aspect, MSN affordances and learning efficiency.
How	This is similar to logical consistency (Popper, 2002; Lee, 1991) described in this section
Why	Explained the relationships in efforts to challenge existing theories, which can be equated, to falsification.
Context	The criteria was met at during the testing of propositions from the whole data set to satisfy the “who, where and when” (Whetten, 1989:492) aspects

(Source:Adopted from Whetten, 1989)

The next section presents the integrated MSN framework as proposed in the research objectives. The preliminary framework was developed using literature and concepts from existing frameworks.

## **6.6 Integrated Mobile Social Network Framework**

Apart from propositions, another objective of the current study was to develop a prescriptive framework which integrates the learner—lecturer aspect, awareness of instructional time, Mobile Social Network affordances, extending instructional time, contact styles and the perceived outcome of such interaction which in the context of this study is learning efficiency. Figure 6.2 provides the Integrated MSN framework proposed in this present study. The framework proposed in this study was formulated to assist lecturers since they are the gatekeepers of instructional time. Furthermore, policy makers are also expected to buy in to the framework suggested in the hope that they can put in place all required infrastructure and policies. The framework is an amplification of FRAME (Koole, 2009), which concentrated only on learner, device and social aspects. In the current context, the learner has been expanded to learner —lecturer aspect while device aspect and social aspect have been encapsulated in the MSN affordances. Moving back to the key argument in the study, awareness of instructional time was added with learning efficiency as the output. Figure 6.2 depicts the logical connection of the key aspects: awareness of instructional time, learner—lecturer aspect, MSN affordances and learning efficiency. Proposition 1 (P1) provides the basic concept that there should be awareness between learner and lecturer in order to utilise MSN applications purposefully. P2 represents Proposition 2 outlined in section 6.2. Within the learner—lecturer aspect, there is

negotiated contact style. The proposition (P3) was falsified after comparing with data from an empirical situation. While there was need for negotiated contact style, it was found to have a lesser effect in the perception of usage of MSN towards extending instructional time. P4 highlights measures which potentially help in the success of MSN utilisation. Other formal support structures, for instance, additional classes (A2), may perhaps assist in improving learning efficiency (P5) as well.

Nonetheless, this study suggests that lecturers must be able to understand and accommodate a contact style preferred by the learners. Lecturer presence played the role of enforcer of rules in the current study to avoid chaos, as suggested by FB2-2. In addition, the lecturers' role of 'more competent other' gave guidance and direction of conversations on WhatsApp. The rules are supposed to be drafted by the policy makers. One of the challenges observed in the current study was absence of policy support on MSN applications. In order to lessen chaos, prior to WhatsApp collaboration for this study, rules were agreed upon together between the researcher and participants. These were then drafted and each participant signed as section of the terms and conditions under which participation was to be executed.

Based on the assumption that rules or policies will be enacted before implementation by the colleges and/or policy makers and adhered to, the study suggests that positive experiences from MSN affordances may potentially lead to extended instructional time. This was well supported by Proposition 2. As observed from the findings, some of the perceived benefits under mobile affordances included: mobility, motivation, immediacy, scaffolding and many others. On the other hand, social affordances experienced by learners appear to have positively assisted in increased collaboration ultimately extending instructional time. Among others, key social affordances included symbol variety, peer learning, and identification of key nodes. During interviews, the majority of the learners were able to identify learners who were giving most of the correct answers within their groups and made efforts to link up with them.

Moving on to MSN affordances, again it is important for the participants, particularly the lecturers, to understand challenges associated with such initiatives. Issues of connectivity are still relevant and if not addressed prior to implementation, may potentially derail the project. With regards to connectivity issues, one of the participants, FB2-22 suggested:

... The colleges should provide us with data. That is my thinking outside the college because some of us ... we do want to join these groups, but

the problem —say for example, if someone sends a video, the thing that I did not understand while I am watching the video, the data gets finished. And my knowledge was still there and I am trying to focus and I don't have money to buy data. Maybe after three weeks I get the data and I am behind and I have to scroll down and check all the messages while some other students are proceeding. By then it will be too much for us. [FB2-22]

This was to show the extent to which connectivity affects participation.

While implementing MSN, the lecturer must always be on track regarding the initial purpose of extending instructional time. Although it may pose some challenges, checking with all the participants on whether the platform is working as to their expectations helps improve inclusivity. Part of the findings demonstrated the existence of social loafers and hitch-hikers, early identification of such characters and motivating them to participate may improve collaboration. A possible solution implemented in this study is, when addressing learners, to start by saying “Hi, All” to signal inclusivity (see Appendix 12A-E).

Having developed the MSN framework shown in Figure 6.2, the current study makes no claim that the framework is the best. Instead, the researcher suggests that through the proposition of such a framework, the researcher has provided a launching pad for further extension of other factors which might be of paramount importance for future studies along the same context.

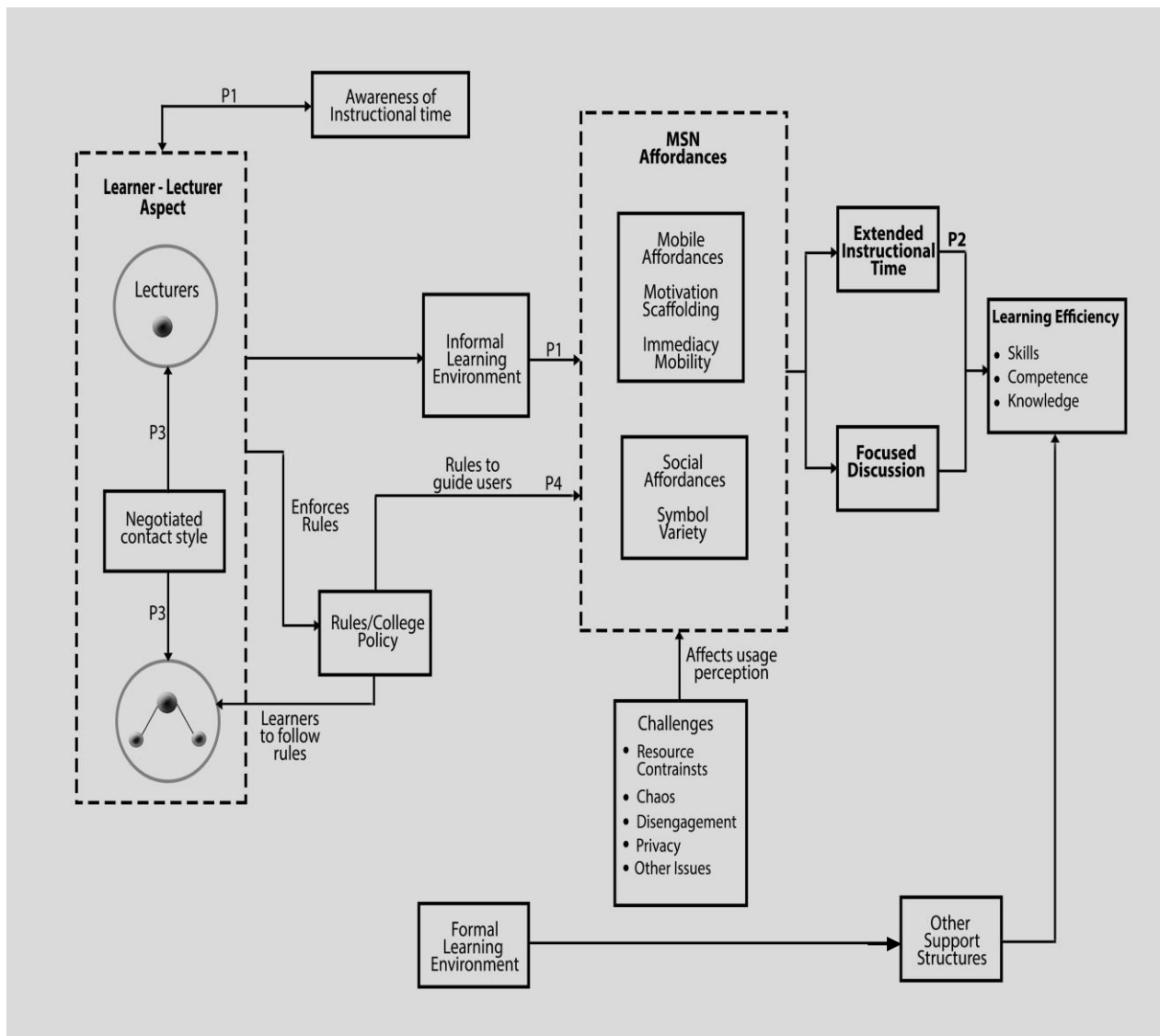


Figure 6. 2: Integrated Mobile Social Network Framework

## 6.7 Conclusion

This chapter discussed the propositions, which emerged from the empirical setting and how they were integrated into MSN framework. In addition, the chapter demonstrated how the propositions were tested for the purposes of trustworthiness of meta-inferences. As Whetten (1989:491) stated: “Theorists must convince others that their propositions make sense if they hope to have an impact on the practice of research”. Apart from testing, propositions were validated against other researchers’ criteria. Furthermore, the resulting integrated MSN framework encapsulated the propositions in an attempt to show logical connection and explaining the ‘why’ (Whetten, 1989) aspect. Chapter Seven discusses the key findings and how they answered the research question.

## CHAPTER SEVEN: SUMMARY OF FINDINGS AND DISCUSSION

### 7.0 Introduction

The study's research agenda was to find out how extending instructional time can help to improve learning efficiency through use of MSN interventions. The study was executed under the following research question and sub-questions outlined as:

*How can instructional time be extended using Mobile Social Networks (MSN) to enhance learning efficiency of Technical Vocational Education and Training learners?*

The sub-questions were listed as follows:

1. *What are the key factors contributing to differences in instructional time?*
2. *How do the different Instructional Time Contact styles affect participation?*
3. *How can MSN be used to increase Instructional Time?*
4. *How can an Integrated Mobile Social Network framework guide TVET practitioners and policy makers in addressing Instructional Time issues?*
5. *To what extent do learners and lecturers perceive the usefulness of MSN in dealing with instructional time discourse for learning purposes?*

Discussion of the results in the present chapter followed the above research questions above, and the significant findings are presented in that particular order. This discussion chapter aims to answer the research question which guided the study (Hussey & Hussey, 1997; Tharenou, Donohue & Cooper, 2007). As it was highlighted earlier in literature that learners lose valuable learning time, the researcher's speculation proved positive at all the participating centres throughout the year. After data collection, he is convinced that instructional time loss is an issue which potentially affects learning efficiency. Early literature on instructional time loss has been well extended in this study. As has been seen from the results, using WhatsApp technology was well accepted by the learners. Section 7.1 presents a background from which the research was conducted.

### 7.1 Positioning the discussion background

As reflected by the review of the literature, many studies neglected the stated problem of instructional time and possibly how it contributes to learning efficiency. While there have been technology-mediated initiatives in a number of studies (Garrison *et al.*, 1999; Spencer & Hiltz, 2003; Rambe & Bere, 2013; Bere & Rambe, 2016), the majority of these studies used in the

current study appear to have different objectives in their application. Furthermore, the studies which dealt with instructional time (Gettinger, 1989; Abadzi, 2009; Rivkin & Schiman, 2015) mismatched the context of developing countries and particularly NCV programmes, with most of them having been carried out either at schools or universities. The studies which focused on NCV learners (Papier, 2009; Powell & McGrath, 2013; Papier, Needham & McBride, 2012; Papier *et al.*, 2016) seem to focus more on challenges of programmes and do not have practical initiatives such as the one carried out in this study. Assumptions of these studies, therefore, were distinct in nature and context. Moving on to participants, the researcher discusses the learner, the lecturer and the researcher for a retrospective look at the people involved in the study.

## **7.2 Discussion of research participants**

The key participants in the study were the learners, lecturers and the researcher, each of whom is discussed in sections 7.2.1 to 7.2.3.

### **7.2.1 Learners**

As targeted by the Department of Higher Education of South Africa, the researcher found that most of the learners had the prerequisites for the programme. While cross-sectional data from the interview data in Phase 3 reflected that the majority of the learners who progressed through to Level 4 had attained Grade 12 before enrolling for NCV, the researcher did not find any learners who did not meet the entry requirements (see Table 5.39). The results evoked a clear picture that learners of different cognitive entry behaviours were mixed in the programme; however, the differentiation of abilities was not the key focus of the study and might require another discussion. At least there was satisfactory evidence that participants met entry requirements, thus justifying perfection of the sample.

### **7.2.2 Lecturers**

In terms of demographics, all lecturers who took part in the study (N=5) had minimum entry qualifications to teach NCV Computer Programming. This finding contradicts Gewer's (2016) study which cited an NBI report where two-thirds of lecturers were reported to be without teachers' qualification. In the current study, only two lecturers did not possess a teaching qualification: LFC1GM and LCC1MM (see Table 5.3); however, the two highlighted that they had a strong industry background. All in all, they had moderately satisfactory experience (see Table 5.3). The researcher presents the lecturers' data as it is vital in awareness of instructional time and the learner—lecturer aspect proposed in the framework.

### **7.2.3 Researcher**

As a faithful reporter, the researcher was privileged to have a solid understanding of Computer Programming and believes this helped to gain the support of the learners since they perceived that they were working with someone with a solid programming background. Through interactions with the learners, the researcher immersed himself in the study as he wanted to see positive outcomes of the intervention. He believes he ended up participating far more than the lecturers in the respective group and was able to constantly do member checking, in some cases flipping his teaching role to that of the researcher for deeper understanding.

### **7.3 Awareness of instructional time**

In any context, a solid understanding of the problem is essential for the participants to find and suggest a best possible solution. An unanticipated result to emerge from the data was that lecturers lacked a solid understanding of the instructional time aspect. Contrary to the researcher's belief that lecturers would know the amount of time required for teaching Computer Programming as stipulated in subject guidelines provided by the Department of Higher Education of South Africa, the information obtained was negative. For instance, when asked the total number of hours needed for Computer Programming, LBC1FV responded: "Per week ... aaaah. It's about ... eeee .. let me just calculate it for you because for all my classes together it's 1.5 hours per day which means 4, 5 hours per week". However, studies (Karweit, 1985; Gettinger, 1989; Corey *et al.*, 2012) reviewed in this study also do not explicitly mention awareness on the part of teachers or lecturers of the amount of time required for the specific subject, making it problematic to tell whether awareness was positive or negative. If at all, there was positive awareness; one probable explanation of this could be that given by Cuban (2008:249) who commented that: "policy elites have disregarded teacher and student perspectives on time in school". If equated to the case under study, then it can only be assumed that lecturers never bother to know because even if they do, they would not have space and power to implement the changes while at school. Nonetheless, in this study, only when instructional time loss and need to extend it beyond the college walls was highlighted to the lecturers, they seemed to appreciate the idea. Nevertheless, appreciating the idea and adoption are still two different aspects.

On the other hand, in Phase 2 and 3, learners, just like their lecturers, were not aware of the amount of time allocated for the Computer Programming class. What was apparent to them was the fact that they lost learning time throughout the year. A notable statement came from FB2-

13, who commented: “Yes, it can help through the time we lose at college ... the lecturer can give us some homework through) WhatsApp”. These sentiments were also shared by FB2-8, who said: “No, it never crossed my mind until it was introduced ... that is when I went back and thought, OK, there is a lot that is missing?”

These results on awareness were important as it gave a solid understanding that possibly, the lecturers and learners were not conscious of the phenomenon. As such, contributions to learning efficiency issues of knowledge, skill or competence may possibly be emanating from the mentioned unawareness. Once learners were aware, even if they might not have participated significantly on the WhatsApp group, the researcher cautiously suggests that the learners might have put in other measures in any form to make sure they perform better. Later, final results which were presented reflected that there was a 100% pass rate at FB1. Noticeably, this is the campus where learner awareness seemed to have been better, compared to other colleges. Awareness of instructional time prompts learners and/or lecturer to implement initiatives to recover the lost time or supplement existing time. Undocumented evidence reflected that at CC College, on the day of the final examination, there was a power failure. Because there were no alternatives in place, learners lost substantial time and were made to sit in the exam room for nearly three and half hours, which was quite deplorable, before commencing the exam after such an experience. Possibly the situation might have contributed to CC learners having scored so low (see Table 5.55 row 4) compared to the other four colleges. These were very worrying disturbances which might have affected their final results.

As part of ethics, it was agreed that results would be shared with the participants. Participants were surprised when informed on the approximate amount of time reported back as being lost throughout the year. There were many inconsistencies in recording of instructional time on the part of the lecturers. At face value, results on attendance created a perception that instructional time was not ‘that bad’ at class level. However, when reflecting on the amount of time colleges had lost if they had followed the DHET calendar, lecturers were shocked. To confirm the above, LSC01 mentioned that he had two registers, the formal one and an informal one. According to him, accurate recording was kept on the informal registers and was the one which used for the study. The researcher believes that attendance at the remaining colleges needs to be interpreted with caution since most if it came from official registers. The researcher found out that lecturers are told by their immediate managers after each disruption how to record attendance. Under such circumstances, the same disruption may potentially be recorded and interpreted differently

from college to college, which could lead to careless reporting. Part of these findings provide powerful conclusions to the main research question stated as:

*How can instructional time be extended using Mobile Social Networks (MSN) to enhance learning efficiency of Technical Vocational Education and Training learners?*

Before implementing any initiative, the ‘*how*’ (Whetten, 1989) part must be preceded by a solid awareness of instruction time for the implementation of any initiative to be a success. These findings were quite encouraging. *The objective was to contextualise the use of MSN in extending instructional time for enhancing learning efficiency.* The research question was broken down into smaller manageable sub-questions in an attempt to have a complete assessment of the problem. Similarly, corresponding objectives were drawn up, as reflected in Chapter 1 section 1.3.

### 7.3.1 Learner —lecturer aspect

Learner —lecturer support has emerged from the findings as a key aspect in the integrated MSN framework. One of the criticisms of the FRAME model presented in Chapter Three was the absence of the lecturer. Proposition P2 presented learners being asked in Phase 2 what they felt regarding lecturer presence in the WhatsApp groups. Table 7.1 shows examples of key sentiments shared by learners regarding lecturer presence on WhatsApp groups.

**Table 7. 1: Learner—lecturer-led groups**

<b>Anchor Code</b>	<b>Key Sub-code</b>	<b>Key Comments</b>
Perceived impact	<b>Rules</b>	“Yes, groups that are not managed by higher authority are usually a waste of time, there is no control, no order”
	<b>Focused Discussion</b>	“Yes, because as we are the students alone on the group we don't focus, we just send our silly stuff.”
	<b>Leading and Confirmation</b>	“Yes, WhatsApp groups with students are also very effective but with a lecturer we could maybe get a better understanding and a confirmation whether something is right or not”

In Phase 3 during the interviews, learners also highlighted that the presence of lecturer was important. FB2-2 confirmed the idea of focused collaboration by saying: “The one with lecturer has rules so we know what time to communicate and what time not to communicate. So on the learners group we communicate anytime we want to.” The findings corroborate the study by Garrison, Anderson and Archer (2010) which, among other aspects, validated teaching presence

on technology-mediated initiatives. The researcher has observed how the lecturer's presence instilled motivation among learners at different colleges during the research and how learners constantly asked for guidance. While Tagg and Dickinson's (1995) results showed no support for the number of tutor messages to student activity, they concluded that in other circumstances, it can improve learner activity. Nevertheless, in the current study, what cannot be disputed is the fact that learners were in fact excited to have lecturers in the group. Hence, unlike the other models, the learner—lecturer aspect has been combined since the lecturer provides the scaffolding needed by learners to move from the ZAD to the ZPD. The learner—lecturer aspect contributes in answering the key research question presented again section 7.3.

#### **7.4 Discussion of factors contributing to differences in instructional time**

Key factors are discussed under the following sub-headings: time-tabling, transport issues, lecturer incapacity, lack of support, and mismatch of learners. The discussion attempts to answer the sub-question earlier phrased as: What are the key factors contributing to differences in instructional time?

##### **7.4.1 Time-tabling**

In this section, the researcher discusses his observations on instructional time differences from observations made in the documents. He also discusses what the learners and lecturers felt to have been the major contributors of instructional time difference. As can be seen from Table 5.4, it was apparent that there were instructional time differences. First, the number of periods which each college had per week was different. Second, the length of each lesson was also different. This had an ultimate effect on the total amount of teaching time reserved for the subject. More surprising were the time-tabling differences for FB1 and FB2, which are under the same administration. Possibly timetables are compiled simply to ensure that a lecturer has sufficient periods.

Moving on to learners' responses during the questionnaire, the majority (46.58% out of 73) of the responses strongly agreed that poor time-tabling and allocation contributed to the instructional time difference (see Table 5.22).

There is no explicit mention of time-tabling as an issue in literature reviewed in this study. Closer to time-tabling as such, studies mention length of school terms and school days (Stallings 1980; Karweit, 1985; Berliner, 1990); however, Stallings' (1980) argument again has some

element of truth, suggesting that learners could have a specific time allocated but be either mentally absent, or many things might occur during that time. In addition, there is no uniformity in instructional time usage among lecturers. The discussion presented in this section showed precisely how the objective stated as: **To understand instructional time differences within the NCV programmes**, was met. Section 7.4.2 discusses how the researcher met objective 2 of sub-research question 2, stated as:

**To identify and explain factors which contributed to differences in Instructional time**

#### **7.4.2 Transport Issues**

Transport issues was indicated by both lecturers and learners as a significant contributor to instructional time difference as it leads to punctuality issues and absenteeism. One of the lecturers mentioned that the reasons given for absenteeism was: "... of the trains never working..." (see Figure 5.7). From the questionnaire responses in Phase 2, most of the learners were positive about the effect of each of the causes of their losing time, for instance taxi violence (n=66), train disruption (n=63) and not having bus/taxi fare (n=45) (see Table 5.21). In Phase 3, the transport emerged as a major contributor to instructional time differences (see Table 5.38).

It is surprising that literature reviewed in the current study seemed not to accord the issue of transport the impact it has on instructional time. Since most of these studies (Stallings 1980; Karweit, 1985; Berliner, 1990) have been conducted in developed countries, it can be inferred that issues of transport are possibly not as pronounced as in developing countries such as South Africa. Nonetheless, studies carried in Africa (Abadzi, 2007, Papier 2009, Powell & McGrath, 2013; Blom, 2016) evoke more complex issues which are more about policy rather than learners' real daily experiences.

#### **7.4.3 Lecturer incapacity**

While literature (DHET, 2009, 2015, 2017; Gewer, 2016; Blom 2016; Wedekind & Watson, 2016) laments lecturer incapacity, none of the interviewed Computer Programming lecturers was not qualified. The least qualified lecturer (LCC1MM) was completing his Honours degree in the same year. The issue of a teaching qualification as a prerequisite is still controversial considering that the courses are vocational, which might require more competency in the subject area than teaching methodologies. However, the prerequisite of a qualification one level higher than that which one is currently lecturing, was met by all lecturers. While there were traces of quality of instruction, for instance at FB2, the respective lecturer was among the most qualified.

FB2-2, a learner from the same college, commented: “I think the lecturer should be free so that we can be able to communicate with the lecturer without having any fears”. The researcher is of the opinion that it may be an issue of lecturing style and lack of interest on the part of the lecturer.

#### **7.4.4 Lack of support**

Coupled with time-tabling was computer lab allocation. Learners felt that there was a need to have a dedicated lab for Computer Programming practice where they could go and work whenever they wished. As commented by FB1:9: “Many times the lab is not available because of another class ...mood is affected”. This was supported by FB2-18, who said: “There are situations where you want to access the lab and the lab is not available”. While literature has shown different forms of support. Such as funding and student support services (McGrath & Akoojee, 2009; Wedekind, 2016; Blom, 2016) which the South African government has attempted to improve, the researcher suggests that the current cohorts of learners require a different type of support, for instance, data. This is reflected in the response from FB2.22, who suggested that “...The colleges should provide us with data. That is my thinking outside the college...”. Support should no longer be limited within the college premises. Resource constraints such as insufficient data limit learning to physical classrooms. Undeniably, the government of South Africa has introduced a number of initiatives towards learner support, but there could a mismatch of support. This study has shown a distinction between the type of support expected by learners and that given to them. The researcher would suggest a modern approach in the consideration of mobile affordances.

#### **7.4.5 Mismatch of learners**

Literature (Papier, 2009; Gewer, 2009; Papier, 2009; Winch, 2013) suggested mismatch of learners in general as another key issue contributing to disparities in TVET success. Findings from the current study also point to this. Out of 32 learners interviewed in Phase 3, very few (3%) had Grade 9 as their highest school grade, while the majority had Grade 12 (66%). At the inception of NCV, Grade 9 was pitched as the minimum entry qualification, resulting in a mix of learners, but observations reflected that most of them ended up withdrawing from the course. The literature reviewed in the present study is in line with the current findings. While this was not the major focus of the study, the picture depicted corroborates the literature findings on a smaller scale.

Issues such as of governance and TVET social image had no significant impact on differences in instructional time and are not reported here. Section 7.4.2 to 7.4.5 explained how the researcher met the objective stated as:

**To identify and explain factors which contributed to differences in Instructional time**

## **7.5 Discussion on Instructional time contact styles in MSN environments**

The objective for research sub-question was stated as:

**To assess the link between different instructional contact styles between learner and lecturer**

The findings presented in Chapter Five established mixed reactions to instructional contact styles. While findings from lecturer interviews suggested confluence (40%) and retroreflection (40%) as the preferred style by most of them, learner responses from questionnaires reflected deflecting style as preferred choice. A further observation was that instructional contact styles appear to have been impacted by what happens between the learner and lecturer during the face-to-face classes. For instance, in the case of FB2 College, FB2-2 commented: “I think the lecturer should be free so that we can be able to communicate with the lecturer without having any fears”. So, in line with contradictions to the study expectations, the resultant proposition (P3) was negated. In as much as the objective was to identify neutral contact style, the mixed reactions made this impossible. While the suggested contact style from the literature section was deflection and desensitising, the findings reflected disparities. Lecturers’ and learners’ contact styles were different in some instances. Nonetheless, the lecturer should be able to deduce the contact style expected of him or her by the learners.

The next section discusses the findings on the aspect of instructional time for the purposes of answering research sub-question 3 set out in section 1.3 as:

*How can MSN be used to increase instructional time?*

## **7.6 Discussion on usage of MSN in increasing instructional time**

This section discusses key findings on instructional time, which assisted in answering research sub-question 3 stated as:

*How can MSN be used to increase instructional time?*

### **7.6.1 Recording of lost time**

Findings showed inconsistencies in lecturers' recording of lost time. While they used ITS registers, there were instances where they would record learners as present in a case where the lecture was not conducted. For instance, when asked how they record instructional time loss, LSC01 responded: "On [the official list, we don't want to mark the student absent, so we mark absent with a reason in terms of official recording...". LFB1GM had this to say: "So you would actually see, maybe as a managerial thing, it's in line with the idea maybe to say we don't want them to lose as far as their transport (allowance) is concerned...". So on paper, the record would look as if attendance was good, but in reality it would not be the case. This corroborates comments by Carroll (1963) that instructional time is multifaceted, making it difficult to measure. Even if learners are present in class, they may not be engaging with learning content. Taking, for example, the CC1 theory mark and comparing it with the number of class periods missed, there seems to be no association in terms of performance. If we uphold the suggestion by Duncheon and Tierney (2013) that time should not be treated as a linear construct, then it might possibly be deduced that learners have been contacting each other virtually on class-related issues. In this discussion, the researcher has provided findings to answer the objective listed in Table 1.1:

**To evaluate relationship between Instructional time and attendance.**

### **7.6.2 Focused discussion**

The findings on the intervention used in this study of WhatsApp suggested many things. The researcher would concur with Duncheon and Tierney's (2013) treating instructional time as a virtual construct and avoid looking at it as a linear construct. Most of the learners suggested that they would prefer WhatsApp to be used for other subjects since the one they had for Computer Programming was a success with regards to focused discussions (see Tables 5.34 & 5.37). However, one key challenge emerged as a stumbling block to the implementation of such groups: resource constraint. For successful implementation, learners suggested that colleges should support them with data. However, while learners identified resource constraint as a challenge the researcher did not find any learner who claimed to have taken advantage of wireless ad hoc networks (Mao *et al.*, 2016) or delay-tolerant networks (Kayastha *et al.*, 2011), as suggested in literature to lessen the challenges. In addition, learners suggested that if there were no rules for the group, there would be chaos. While the reviewed literature never suggested focused discussion, rather focusing on motivation, the researcher is still convinced that one might lead to another.

### **7.6.3 Mobility**

Literature (Mao *et al.*, 2016) suggested that instant messaging capability in MSN allows instant feedback despite dangers of disjointed and fragmented knowledge which may result. Learners who participated in the study indicated mobility as one of the perceived benefits which persuaded them take part in the MSN group (see Table 5.31). In addition, learners felt that MSN enabled scaffolding, leading them to perform tasks with which, under normal conditions, they would have struggled. While there were a number of positives, lecturer negativity was prevalent. LSC01 kept on suggesting that he would join the group once he obtained a dedicated sim card. Gikas and Grant (2013:23) also highlight lecturers' technology resistance. However, device issues and usability were non-existent as all learners indicated that they had a smartphone. Such issues may require further interrogation. Nonetheless, using MSN allowed lecturers to make contact with their learners and extend teaching and learning beyond face-to-face classes. The discussion presented in the current section provides the extent to which the study objective was achieved: To identify how MSN can be used to increase instructional time. Together, the two objectives discussed in the present section answer sub-question 3:

*How can MSN be used to increase instructional time?*

## **7.7 Discussion on using an integrated MSN framework to guide role players**

In this section the researcher discusses key findings on the perception of lecturers and learners regarding the need for an integrated MSN framework. The research question was tabled as:

*How can an integrated MSN framework guide TVET practitioners and policy makers in addressing instructional time issues?*

During lecturer interviews, three key categories were suggested (see Table 5.10). First, the lecturers appeared to have some fears in engaging learners in an unregulated environment. Many of their fears were related to privacy issues, possible chaos in the absence of a guiding framework and potential bullying issues. Second, of the five lecturers interviewed, most preferred a standardised platform where the college has full control to address any potential issues arising. Third, the lecturers felt that if there were a policy, then infrastructure would follow (see Figure 6.1) in support of MSN platforms based on the assumption that the colleges might be willing to subsidise resources such as data. In corroboration with what lecturers said, learners applauded the use of rules in the WhatsApp group (see Figure 5.26). They liked the focused discussions which emerged because of the rules agreed on. In Phase 3, participants suggested that presence of lecturers on WhatsApp group instilled confidence among learners

since they had a great deal of respect for the lecturers. A synthesis of the FRAME model (Koole, 2009) was given in section 3.6, and one of the criticisms identified had been lecturer absence — a gap which the proposed framework attempts to close. The suggested integrated framework presented (see Figure 6.2) highlights prescriptions which would facilitate successful implementation of MSN platforms. The model presents what policy makers and lecturers should be aware of prior to implementation.

This section presents a discussion answering the sub-question. The objective was:

**To propose a prescriptive integrated MSN framework to guide TVET practitioners and policy makers in addressing instructional time**, which has been presented in Chapter 6 (see Figure 6.2).

## **7.8 Perception of learners and lecturers on usefulness of MSN in dealing with instructional time discourse**

In this section the researcher articulates the key findings on the perception of learners and lecturers on the usefulness of MSN in dealing with instructional time. The perceptions discussed are in two major categories: 1) perceived impact of MSN, and 2) perceived benefits of MSN

### **7.8.1 Perceived impact of MSN in extending instructional time**

The three benefits which were key in the study were skill, knowledge, and competence. The subsequent section presents key findings on skill.

#### **a) Skill**

This section summarises the key findings on skill. In Phase 1, four out of five lecturers suggested that there was a marked improvement in ISAT execution. When asked about any noticeable improvements, LSC01 responded: “Yes, the standard of this year’s ISAT is a little bit of high standard ...”. LBC1FV corroborated this by saying: “Yes, in a big way ... So you would actually see it was so helpful throughout, even in other assessments ICASS,... So it was so helpful”. Results for ISAT marks of the combined learners (N=89), analysed in Phase 2, indicated a high median of 72% (see Table 5.16). In the context of the current study, three practical tests contributed to skill: practical Test 1 score, practical Test 2 score, and ISAT mark. Comparative data of practical marks indicated that FB1 and FB2 progressed from Term1 to Term3 (see Figure 5.41), potentially suggesting an impact in WhatsApp groups. Assuming that skill is a product of experience and training, as suggested in Nygaard *et al.*, 2008, the researcher

believes that using WhatsApp constantly engaged the learners with the coding aspects of the subject. For instance, in Phase 3, learners requested video snippets which would allow them to move from ZPD as it aided as a scaffold. In Phase 3, half of the interviewed learners acknowledged having gained skills (see Table 5.36). Interestingly, apart from Computer Programming skills, learners claimed to have gained communication skills (see Figure, 5.21).

#### **b) Knowledge**

In the context of the current study, Theory Test 1, Theory Test 2 and Internal Exam were used as a yardstick for judging knowledge of learners. A comparative analysis of test scores reflected mixed conclusions for knowledge. BC learners' performance in theory progressively decreased from Term1 to Term 3, while performance for CC College learners progressively increased. Test scores for SC College improved significantly in Term 3 as compared to Term 1. During learner interviews, the majority (46.88%, see Table 5.40) suggested that their knowledge had improved as a result of WhatsApp collaboration. However, data for internal examinations reflects a lower median for all the colleges (see Table 5.48 row 5); this may have been attributable to the intensity of the test since learners were tested on all topics covered from the beginning of the year. What was encouraging was the fact that BC and FB1 had a 100% pass rate although the number of learners who sat for the exam had dropped (9 and 15 respectively). Possibly, although learners from BC did not participate to the expectations, they still passed the final examination; the Moodle platform which they used at their college might have assisted. Two colleges (CC and FB2) had the worst performance despite being classified as urban. It appears as if the number of learners in a class together with instructional time loss play a significant role in performance, considering that CC and FB2 had the highest number of learners in each class. Compounded to that effect, most learners who seem to have been affected extensively due to transport issues and service delivery protests were at CC and FB2, living in areas predominantly associated with more social challenges. It can only be suggested that the learners who passed the final examination might have benefitted from the shared experiences (Chatti, Klamma, Jarke & Naeve, 2007) on WhatsApp.

#### **c) Competence**

As a follow-up to the discussion on knowledge, it can be inferred that the learners who passed the final examination were competent since they met the outcomes (Mansfield 2004) as set in the curriculum. On the other hand, however, one could argue that even the learners who failed to pass the final examination might also be competent, assuming that the construct requires

uninterrupted scrutiny for evaluation (Velde & Cooper, 2000). Nonetheless, for articulation purposes, industry or universities use final results for judging competence. When responding to a question on competence in Phase 2 (see Table 5.30), learners were positive that they wanted to improve their year mark. This suggests that they wanted to pass since they knew that competence was the only way they could be regarded as successful in the programme.

## **7.9 Perceived benefits of MSN in extending instructional time**

In this section the researcher discusses the perceived benefits as highlighted in three phases by both learners and lectures.

### **7.9.1 Mobility**

As highlighted on the integrated MSN Framework, one of the key perceived benefits was mobility. Learners enjoyed gaining access to learning content at any given time irrespective of geographical boundaries. Regarding WhatsApp groups, CC1-10 claimed “Yes. It helps learners to ask questions when studying at home.” As highlighted in literature, applications such as WhatsApp are vital in fostering social relationships and user mobility (Mao *et al.*, 2016).

### **7.9.2 Immediacy**

Participants felt that provision of immediate feedback benefited the learners greatly. Any successful communication rests on feedback provided timeously (Spencer & Hiltz, 2003). SC1-7 confirmed that through WhatsApp: “... we get answers quicker than waiting for the next day to go to your lecture”.

### **7.9.3 Symbol variety**

In Phase 3, the researcher observed more demand for videos before examinations, highlighting that learners liked the platform as it aided with visuals which they could follow with ease. Regarding symbol variety, SC1-6 said: “Yes, because it allows videos and voice notes”. Through videos, learners are able to follow programming steps at their own pace.

### **7.9.4 Scaffolding**

Learners felt that inclusion of lecturers within the WhatsApp group not only helped to maintain order, but moved them to a zone where they could work on their own even if support was withdrawn. The act of identifying knowledgeable others or intelligent connections (Siemens, 2004) allowed learners to build stronger relations with peers of higher abilities. These key findings discussed in this section answer one of the research sub-questions set out as:

***To what extent do learners and lecturers perceive the usefulness of MSN in dealing with instructional time discourse for learning purposes?***

The objective was *to understand how learners and lecturers perceive the usefulness of MSN in dealing with instructional time.*

### **7.10 Summary of discussion of findings**

To sum up, addressing learning efficiency through extending instructional time utilising MSN instances, such as WhatsApp, must be preceded by a strong understanding of instructional time awareness from both the lecturer and learners. While there were mixed results in learning efficiency, there was subtle evidence to suggest an association between extending instructional time and improving learning efficiency issues. It will be argued that the potential of the current study initiatives also rest on what happens within the formal leaning environment. The quality of instruction which learners have during face-to-face classes, campus support such as additional computer laboratories, sufficient Wi-Fi access and to a lesser extent, cognitive entry behaviours must also be factored in when implementing support for NCV learners geared towards improving learning efficiency. For instance, this study found that most of the learners who took part in the study had completed Grade 12 before enrolling for NCV.

Chapter Eight provides a brief overview of the research process, contributions, credibility and limitations. It highlights areas which may require further research and the implications of the study, revisits the research process and gives personal reflections.

## **CHAPTER EIGHT: CONCLUSION**

### **8.0 Introduction**

The current chapter concludes the study with the following discussions: a) review of research methodology and approaches; b) practical and theoretical contributions; c) credibility of the study; d) limitations of the current study, e) suggested future research; and f) personal reflection.

### **8.1 Review of research methodology and procedures**

The current research process has been influenced by Pierce's pragmatic assumptions on the basis that people acquire knowledge through practice (Goldkuhl, 2012; Maxcy, 2003) as a result of interaction with society. As such, reality keeps changing. The researcher found this idea more plausible when investigating social processes such as learning. As Hyde (2000) notes: society changes and so are the associated processes. What is truth today may not be so tomorrow. In the case of WhatsApp, it might have worked well in the current context, but may not be the same in future as other platforms keeps emerging. Adopting pragmatism in the study meant that the current research remained guided by the research questions rather than philosophical assumptions.

In addition, technology seems currently to be shaping the learning path more than before. Furthermore, pragmatism precluded the researcher from pursuing philosophical issues; hence, the focus was to generate actions to solve the challenges associated with NCV learners studying Computer Programming. The duty of the researcher is to give rise to change (Goldkuhl, 2012).

Using WhatsApp for extending instructional time assisted learners to realise the benefits resulting from connecting with intelligent nodes. The participation of the researcher highlighted to the other lecturers who took part in the current study the importance of connecting with learners beyond traditional classrooms. In summary, the processes adopted throughout the current study are presented in Table 8.1.

**Table 8. 1: Summary of research methodology and approaches**

<b>Methodologies</b>	<b>Choice adopted</b>
Epistemology	Constructionism (refer to section 4.1.1)
Ontology	Subjectivism
Axiology	Value-laden. Interchanging roles from faithful reporter, mediator of languages and dialogic facilitator.
Paradigm	Pragmatism
Reasoning	Abduction
Strategy	Participatory Action Research
Research choice	Concurrent embedded mixed method (Creswell, 2009)
Sampling	Convenience sampling
Analysis Techniques	Thematic analysis, descriptive and inferential statistics

The procedures used in this study were appropriate to the problem investigated. Using quantitative and qualitative data assisted in developing stronger meta-inferences (Venkatesh *et al.*, 2013) as reflected by the propositions and the integrated MSN framework.

## **8.2 Practical contributions**

In this study, the researcher has demonstrated practically how MSN applications such as WhatsApp can be implemented successfully for extending instructional time for learners studying Computer Programming. While acting as researcher, his role as an empathetic observer demanded more practical interaction with the participants in the WhatsApp group. Irrespective of how lecturers at the various colleges contributed, learners were assured of reliable and credible guidance from the researcher since they knew that he was also an expert in the subject. In his view, the success of the group was achieved through rules which were agreed upon together prior to the research. Currency of information that the researcher provided to the learners was in line with what they expected in their subject. In the cautious opinion of the researcher, WhatsApp discussions which took place just before the final exams may also have contributed significantly to the success of learners at different colleges in their final examinations too (see Table 5.55). Having followed a pragmatic approach which is outcome-oriented (Teddlie & Tashakkori, 2003; Johnson & Onwuegbuzie, 2004), this study has provided a practical alternative to instructional time and learning efficiency issues.

## **8.3 Theoretical contribution**

Apart from a practical contribution, theorising involves adding contribution to theory (Alter, 2016). Theoretical contribution for this study is twofold: The first contribution was the development of five propositions. Research within the TVET studies (particularly NCV) lacked

output of similar nature where learning efficiency has been linked to instructional time and possibly lessened by use of MSN technologies such as WhatsApp. The propositions developed in the current study have been evaluated applying established criteria in Whetten (1989), (see Table 6.2), Popper (2002), and Lee (1991).

The second theoretical contribution of the study is the development of an integrated MSN framework whose foundation has been built on the FRAME model (Koole, 2009). The study demonstrated the importance of the learner—lecturer aspect in MSN environments for focused collaboration and improving learning efficiency. Together, the propositions and the integrated MSN framework developed are expected to be a useful course of action to lecturers in improving learning efficiency through extending instructional time using MSN technology. It is expected that the output of this study would trigger more inquiry on instructional time particularly in the vocational training and education space.

#### **8.4 Methodological contribution**

It is suggested that this study will add more accumulation of evidence to mixed methods procedures. Venkatesh et al. (2013:48) raised concern on “dearth of mixed methods research”. This study suggests the use of mixed methods in studies where the phenomenon of interest is affected by social changes and reality is never constant. In the current study, obtaining qualitative and quantitative data helped to gain deeper understanding, learning efficiency and instructional time within NCV programmes.

#### **8.5 Research Quality**

Quality of research has been evaluated differently (Bryman, Becker & Sempik, 2008). This study adopted constructionist epistemology and pragmatic paradigm. the researcher’s interactions with the learners through WhatsApp was outcome-oriented (Johnson & Onwuegbuzie, 2004). His objective was to make a practical contribution to the NCV learners. The researcher believes, that together with all the participants, they succeeded in making some tangible practical demonstration of how a pragmatic approach of extending instructional time could potentially benefit the learners. While other researchers may not necessarily use WhatsApp, the researcher believes that even if other MSN applications are used under the same conditions, findings are more likely to be the same. The current study focused on three key issues pertaining to trustworthiness in the research process: credibility, dependability, and generalisability.

### **8.5.1 Credibility**

As defined in Bryman (2008:34), credibility deals with “how believable are the findings”. Cohen *et al.* (2007) suggest use of mechanical means for capturing, storing and analysing data as an attempt to internal validity. During analysis, the researcher avoided *a priori* codes because they posed a danger of missing important information from data. Given the iterative nature of the study, he was given the opportunity to discuss his findings from each phase with the participants each time he visited the colleges for data collection. In this case, he was able to do member checking (Cohen *et al.*, 2007; Bryman, 2008) as a strategy to evaluate whether findings in this study were congruent with what the participants meant in their responses. In addition, he was requested to share the results at the Western Cape College Curriculum Committee conference attended by TVET college practitioners, DHET representatives and industry representatives in the Western Cape at Boland College in August 2019.

Researchers have always advocated for triangulation (Johnson & Onwuegbuzie, 2004; Cohen *et al.*, 2007; Bryman, 2008) as an attempt to achieve rigour in mixed methods. Data was collected using questionnaires, interviews and documents. Results from each instrument helped to corroborate participants’ perceptions on extending instructional time and to evaluate learning efficiency as the outcome. Research findings presented in this study were obtained from a natural setting, making them more credible.

### **8.5.2 Dependability**

Dependability is considered as similar to reliability (Cohen *et al.*, 2007; Bryman, 2008). The current study was executed according to the good practice of research: from ethical clearance (see Appendix 2), organisational clearance, seeking consent from participants (see Appendix 4), keeping a record of research data and presenting findings to the participants.

As part of the research process, this work has been presented for comments to two peer reviewers who were studying at other universities. Throughout the research process, findings were also discussed with the research mentor.

### **8.5.3 Generalisability**

Generalisability is the parallel of external validity and deals with the extent to which findings can be applied to other settings (Bryman, 2008; Tharenou *et al.*, 2007). While LeCompte and Goertz (1982) suggest that generalisability could pose an issue in the context where participants are not taken from a random sample; the current study used multiple cases to lessen the

associated challenge. Participants were drawn from two TVET colleges classified as rural and three colleges classified as urban, typical of the South African TVET sector.

In this section the researcher presented how he dealt with issues of quality. Bryman *et al.* (2008) found that issues of quality in mixed methods are dealt with differently, depending with preferences. In this section the researcher used credibility, dependability and generalisation for achieving quality.

## **8.6 Limitations of the current study**

Research limitations provide readers with factors that were beyond the researcher's control, which might have influenced the process including the outcome. Below is a list of some of the limitations:

Having applied the convenience sampling method in the study, generalisation or transferability of results may not be reliable beyond the Western Cape learners. Inherently, convenience sampling poses limits to external validity (Tharenou *et al.*, 2007; Bryman, 2008). Nonetheless, it was crucial to pilot such an initiative, particularly in the Western Cape Province because the objective was to generate practical actions with the aim of assisting the NCV learners in completing their studies. There had not been such an initiative since the inception of NCV. However, during design, the researcher made sure to include every public TVET college in the province offering Computer Programming at NCV level. Ideally, further research using random sampling with NCV learners from different provinces could potentially assist in improving external validity.

Another limitation of the study was the lack of related literature to the problem under study with explicit reference particularly to the NCV sector. While there have been many studies on the TVET sector by local researchers (Papier, 2009; McGrath & Akoojee, 2009; Gewer, 2009; Wedekind & Watson, 2016; Wedekind & Buthelezi, 2016) (list not exhaustive), their studies are far divorced from instructional time and MSN usage. However, there was a great effort to draw on some studies which were done elsewhere focusing on extending instructional time. This study is expected to set the platform for further research in the area as other scholars attempt to confirm or falsify the current findings.

Last but not least, the final results were not analysed and discussed at length because of two major reasons. First, final marks are a combination of final examination test scores together with the Term 1 and Term 2 results. As such, analysing them in detail would create incorrect

inferences. In addition, these results go through cycles of scaling up and down depending on national trends. This was also revealed by LSC01 from SC College who is familiar with the process. Nevertheless, the results helped to identify a number of learners who were regarded as competent for the year 2018. Perhaps a similar study could be carried out over a longer period, possibly two years drawing participants from NCV level 3.

### **8.7 Suggested future research**

This study emerged out of a desire to help NCV learners struggling to complete their studies due to failure to pass Computer Programming. Having observed the instructional time leakages during the normal teaching time, the researcher proposed extending instructional time using WhatsApp beyond the traditional classrooms. While in the field, contrary to his assumption, he discovered that awareness of instructional time was very minimal from the lecturers' side, yet they are regarded as custodians of the construct. Also, it emerged that while learners may be willing to collaborate with fellow peers and lecturers, the effort is constantly hindered by resource constraints. All the participants had no issues pertaining to device availability but rather data issues. This study was executed on the premise that all colleges had Wi-Fi access, which in essence would alleviate data costs for the learners. It turned out that only three colleges (FB1, FB2 and BC) had Wi-Fi hotspots at their college. Data cost seem to be a big stumbling block for learners to communicate with other learners, and lecturers or even to search for information on the internet. A possible area which may require further research would be resource constraints in TVET institutions and how it impacts learning efficiency.

Given the participation of learners on WhatsApp groups used for discussing Computer Programming in the present study, it was apparent that learner value on a specific technology hinges on its currency and popularity at any given time. However, a key challenge which was observed was some kind of resistance from the lecturers' side. While acknowledging that contacting learners outside the college is more additional work, further studies could look at how learning institutions may reward lecturers who provides tuition outside normal teaching time and to what extent it would be beneficial in terms of learner efficiency.

In this study, extending instructional time beyond the normal timetables using WhatsApp corroborated h Duncheon and Tierney's (2013) suggestion that instructional time must cease to be treated as a linear construct and start considering virtual time. However, it was very difficult for the researcher to validate an engagement rate for all participants on the group besides their participation. A key point of interest which might need further investigation would be: To what

extent do learners engage on virtual platforms and potential amount of time regained or extended?

In conclusion, future studies may perhaps explore how MSN platforms such as WhatsApp can include code-enabled extension to allow learners studying Computer Programming to code interactively on the platforms. In fact, it came up as one of the recommendations from one of the lecturers, LFC2WM, who said: “Just seeing a screenshot of something. I don’t think someone might get assistance from that”. Finally, future studies may possibly explore how face-to-face contact styles influence collaboration on MSN platforms. Findings from the current study suggested that learner —lecturer relations from face-to-face interactions had some effect on how successful MSN collaboration would be with the same learners.

## **8.8 Conclusion**

Instructional time in its different forms is a learning resource noticeably connected to pedagogical optimisation. There is need for an all-inclusive approach where learners, lecturers and policy makers are aware of the importance of instructional time. Rather than having quality assurance checks on whether the lecturer has done all assessments, quality of instruction monitored, lesson plans available and others, the instructional time aspect appears to be ignored consistently despite being listed on the educational policy documents. The researcher suggests that the first assessment should be time-tabling. Undeniably, colleges need some autonomy in how they run their day-to-day activities, but at some point, there should be attempts to have a near uniform amount of instructional time. These findings already demonstrated huge disparities in the number of periods missed in each term. The present chapter gave a brief summary or overview of methodologies and procedures, contributions, limitations, and credibility of the study, suggested further research and personal reflections from the study. The final part of the chapter highlighted potential areas that require further interrogation which could not be done in the current study as they fell out of scope, though they are in line with the studied phenomena.

## References

- Abadzi, H. 2007. Instructional time loss and local-level governance. *Prospects*. 37(1):3-16. doi:10.1007/s11125-007-9014-1.
- Abadzi, H. 2009. Instructional time loss in developing countries: Concepts, measurement, and implications. *The World Bank Research Observer*. 24(2): 267–290.
- Akoojee, S. 2009. Scarce skills and public technical and vocational education and training in South Africa: Twin challenges or two sides of the same coin? *Southern African Review of Education with Education with Production*. 15(2):117-138.
- Almendarez, L. 2013. Human capital theory: Implications for educational development in Belize and the Caribbean. *Caribbean Quarterly*. 59(3-4):21-33.
- Alter, S. 2016. Nothing is more practical than a good conceptual artifact... which may be a theory, framework, model, metaphor, paradigm or perhaps some other abstraction. *Information Systems Journal*. 27(5):671-693.
- Anane, C. A. 2013. Competency based training: Quality delivery for technical and vocational education and training (TVET) institutions. *Educational Research International*. 2 (2): 117-127.
- Anderson, L. W. 1976. An empirical investigation of individual differences in time to learn. *Journal of Educational Psychology*. 68(2): 226-233. <http://dx.doi.org/10.1037/0022-0663.68.2.226>
- Avison, D. & Malaurent, J. 2014. Is theory king? Questioning the theory fetish in information systems. *Journal of Information Technology*. 29:327–336. <https://doi.org/10.1057/jit.2014.8>
- Baker, D. P., Fabrega, R., Galindo, C. & Mishook, J. 2004. Instructional time and national achievement: Cross-national evidence. *Prospects*. 34(3): 311-334. <https://doi.org/10.1007/s11125-004-5310-1>
- Barczyk, C. C. & Duncan, D. G. 2011. Social networking media as a tool for teaching business administration courses. *International Journal of Humanities and Social Science*. 1(17): 267-276.
- Barrett M., Walsham G. (2004) Making contributions from interpretive case studies: Examining processes of construction and use. In *Information Systems Research*. IFIP International Federation for Information Processing. Kaplan B., Truex D.P., Wastell D., Wood-Harper A.T. & DeGross J.I. Eds. Springer, Boston, MA. vol 143:293-312.
- Baskerville, R. L. & Wood-Harper, A. T. 1996. A critical perspective on action research as a method for information systems research. *Journal of information Technology*. 11(3):235-246.
- Baskerville, R. L. & Wood-Harper, A. T. 1998. Diversity in information systems action research methods. *European Journal of Information Systems*. 7(2):90-107.
- Baskerville, R. & Pries-Heje, J. 1999. Grounded action research: a method for understanding IT in practice. *Accounting, Management and Information Technologies*. 9(1):1-23.

- Baskerville, R. L. & Myers, M.D. 2004. Special issue on action research in Information Systems: Making IS research relevant to practice- foreword. *MIS Quarterly*. 28(3):329-335.
- Baskerville, R. L. 1999. Investigating information systems with action research. *Communications of the Association of Information Systems*. 2(19):1-32.
- Bazeley, P. 2002. Issues in mixing qualitative and quantitative approaches to research. *1<sup>st</sup> International Conference — Qualitative Research in Marketing and Management*, Vienna. 1-11.
- Becker, G. S. 1962. Investment in human capital: A theoretical analysis. *Journal of Political Economy*. 70(5-2):9-49. doi:10.1086/258724
- Becker, G. S. 1994. Human capital revisited. In *Human capital: A theoretical and empirical analysis with special reference to education*. Becker, G. S. Eds. 3<sup>rd</sup> Edition. The University of Chicago Press. 15-28.
- Benavot, A. & Gad, L. 2004. Actual instructional time in African primary schools: Factors that reduce school quality in developing countries. *Prospects*. 34(3):291-310. doi:10.1007/s11125-004-5309-7
- Benavot, A. 1983. The rise and decline of Vocational Education. *Sociology of Education*. 56(2):63-76. doi:10.2307/2112655
- Bentley, T. 2002. Contact styles. *The Learning Organization*. 9(5):202-205.
- Bere, A. & Rambe, P. 2016. An empirical analysis of the determinants of mobile instant messaging appropriation in university learning. *Journal of Computing in Higher Education*. 28(2):172-198.
- Berliner, D. C. 1990. What's all the fuss about instructional time? In *The Nature of Time in Schools: Theoretical Concepts, Practitioner Perceptions*. Ben-Peretz, M. & Bromme, R. Eds. Teachers College Press, New York, NY: 3-35.
- Bhorat, H., Cassim, A., Kanbur, R., Stanwix, B. & Yu, D. 2016. Minimum wages and youth: The case of South Africa. *Journal of African Economies*, 25(suppl 1), i61-i102.
- Bicen, H., Sadikoglu, S. & Sadikoglu, G. 2015. The impact of social networks on undergraduate learning foreign language. *Procedia - Social and Behavioral Sciences*. 186:1045-1049. doi:http://dx.doi.org/10.1016/j.sbspro.2015.04.072
- Blaikie, N. 1993. *Approaches to social enquiry: Advancing knowledge*. Cambridge: Polity Press.
- Blaikie, N. 2010. *Designing social research. The logic of anticipation*. 2<sup>nd</sup> Edition Cambridge: Polity Press.
- Blom, R. 2016. Throwing good money after bad: Barriers South African vocational teachers experience in becoming competent educators. In *Change management in TVET colleges: Lessons learnt from the field of practice*. Kraak, A., Paterson, A., & Boka, K. Eds. Cape Town, South Africa: JET Education Services. 47-63.

- Bloom, B. S. 1968. Learning for mastery. Instruction and curriculum. Regional education laboratory for the Carolinas and Virginia, topical papers and reprints, number 1. *Evaluation Comment*. 1(2):1-12.
- Bloom, B. S. 1974. Time and learning. *American Psychologist*. 29(9):682-688. doi:10.1037/h0037632.
- Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H. & Krathwohl, D. R. 1956. *Taxonomy of educational objectives: The classification of educational goals. Handbook 1: Cognitive domain*. New York: David McKay Co Inc.
- Blumberg, B., Cooper, D. R. & Schindler, P. S. 2008. *Business research methods: 2<sup>nd</sup> European edition*, Maidenhead.: McGraw-Hill Higher Education.
- Boell, S. K. & Cecez-Kecmanovic, D. 2015. On being ‘systematic’ in literature reviews in IS. *Journal of Information Technology*. 30(2):61-173.
- Boyatzis, R. E. 1998. *Transforming qualitative information: Thematic analysis and code development*. Thousand Oaks, CA: Sage.
- Boyd, D. & Ellison, N. 2010. Social network sites: Definition, history, and scholarship. *IEEE Engineering Management Review*. 3(38):16-31.
- Bradley, C., Haynes, R., Cook, J., Boyle, T. & Smith, C. 2009. Design and development of multimedia learning objects for mobile phones. In *Mobile learning: Transforming the delivery of education and training*. Ally, M. Ed. AU Press, Athabasca University, Canada. 157-182.
- Braun, V. & Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative research in psychology*. 3(2):77-101.
- Braun, V. & Clarke, V. 2013. *Successful qualitative research: A practical guide for beginners*. London: Sage.
- Braun, V. & Clarke, V. 2016. (Mis)conceptualizing themes, thematic analysis and other problems with Fugard and Potts’ (2015) sample-size tool for thematic analysis. *International Journal of Social Research Methodology*. 19(6):739-743. <https://doi-org.ezproxy.uct.ac.za/10.1080/13645579.2016.119>
- Brockmann, M., Clarke, L. & Winch, C. 2008. Knowledge, skills, competence: European divergences in vocational education and training (VET)—the English, German and Dutch cases. *Oxford Review of Education*. 34(5):547-567. DOI:10.1080/03054980701782098.
- Brooks, J., McCluskey, S., Turley, E. & King, N. 2015. The utility of template analysis in qualitative psychology research. *Qualitative Research in Psychology*. 12(2):202-222.
- Brownell, P. 2010. *Gestalt therapy: A guide to contemporary practice*. New York. USA : Springer Publishing Company..
- Bryman, A. 2008, *Social research methods*. New York: Oxford University Press Inc..

- Bryman, A., Becker, S. & Sempik, J. 2008. Quality criteria for quantitative, qualitative and mixed methods research: A view from social policy. *International Journal of Social Research Methodology*. 11(4):261-276.
- Caldwell, J. H., Huitt, W. G. & Graeber, A. O. 1982. Time spent in learning: Implications from research. *The Elementary School Journal*. 82(5):471-480.
- Campbell, J. L., Quincy, C., Osserman, J. & Pedersen, O. K. 2013. Coding in-depth semi-structured interviews: Problems of unitization and inter-coder reliability and agreement. *Sociological Methods & Research*. 42(3):294-320.
- Cappelli, P. H. 2015. Skill gaps, skill shortages, and skill mismatches: Evidence and arguments for the United States *ILR Review*. 68(2):251-290. Doi: 10.1177/0019793914564961
- Carroll, J. B. 1963. A model of school learning. *Teachers College Record*. 64(8):723-733.
- Chalmers, A.F. 1999. *What is this thing called science? CITY?* Australia: University of Queensland Press,.
- Chaiklin, S. 2003. The zone of proximal development in Vygotsky's analysis of learning and instruction. In *Vygotsky's educational theory in cultural context*. Kozulin, A., Gindis, B., Ageyev, V. & Miller, S. Eds. 1<sup>st</sup> Edition. Cambridge: Cambridge University Press. 39-64.
- Chatti, M. A., Klamma, R., Jarke, M. & Naeve, A. 2007. The web 2.0 driven SECI model based learning process. *Seventh IEEE International Conference on Advanced Learning Technologies (ICALT 2007)*. 780-782.doi:10.1109/ICALT.2007.256
- Cherryholmes, C.H. 1992. Notes on pragmatism and scientific realism. *Educational Researcher*. 21(6):13-17.
- Clara, M. & Barbera, E. 2013. Three problems with the connectivist conception of learning. *Journal of Computer Assisted Learning*. 30(3):197-206.
- Clarke, B. L. 1974. The argument from design—A piece of abductive reasoning. *International Journal for Philosophy of Religion*. 5(2):65-78.
- Clark, R. C., Nguyen, F. & Sweller, J. 2011. *Efficiency in learning: Evidence-based guidelines to manage cognitive load*. San Francisco, CA. :John Wiley & Sons.
- Cloete, N. Ed. 2009. Synthesis. In *Responding to the educational needs of post-school youth: Determining the scope of the problem and developing a capacity-building model*. African Minds. Cape Town, South Africa: Centre for Higher Education Transformation (CHET).1-17.
- Corbin, J. & Strauss, A. 2008. *Basics of qualitative research: Techniques and procedures for developing grounded theory*. 3<sup>rd</sup> Ed. Los Angeles, CA: Sage Publications.
- Cohen, L., Manion, L. & Morrison, K. 2007. *Research methods in education*. 6<sup>th</sup> Edition. Milton Park, Oxon: Routledge.

- Connelly, L.M. & Peltzer, J. N. 2016. Underdeveloped themes in qualitative research: Relationships with interviews and analysis. *Clinical Nurse Specialist*. 30(1):51-57.
- Corey, D. L., Phelps, G., Ball, D. L., Demonte, J. & Harrison, D. 2012. Explaining variation in instructional time. *Educational Evaluation and Policy Analysis*. 34(2):146-163. doi:[10.3102/0162373711431098](https://doi.org/10.3102/0162373711431098)
- Cramer, M. & Hayes, G. 2010. Acceptable Use of Technology in Schools: Risks, Policies, and Promises. *IEEE Pervasive Computing*. 9(3):37-44. DOI:10.1109/MPRV.2010.42.
- Creswell, J. W. 2003. *Research design: qualitative, quantitative, and mixed methods approaches*. 2<sup>nd</sup> Edition. CA: Sage.
- Creswell, J.W. 2007. *Qualitative inquiry and research design: Choosing among five approaches*, 2<sup>nd</sup> Edition, Thousand Oaks. CA: Sage
- Creswell, J.W. 2009. *Research design: Qualitative, Quantitative and mixed methods approaches*, 3<sup>rd</sup> Edition, Thousand Oaks, CA: Sage
- Crotty, M. 1998. *The foundations of social research meaning and perspective in the research process*, London: Sage.
- Cuban, L. 2008. The perennial reform: Fixing school time. *Phi Delta Kappan*. 90(4):240-250.
- Denzin, N. K. & Lincoln, Y. S. (Eds) 1998. Introduction: The discipline and practice of qualitative research. In *The landscape of qualitative research: Theories and Issues*. 3<sup>rd</sup> Edition. c. Thousand Oaks, CA: Sage. 1-46.
- Department of Higher Education and Training. (DHET) 2009. *Further Education and Training colleges. National Certificate (Vocational). Report 190/19. Report on the conduct of national examinations*. Pretoria, South Africa: Department of Higher Education & Training.
- Department of Higher Education and Training. (DHET) 2013. *White paper for post-school education and training. Building an expanded, effective and integrated post-school system*. <http://www.dhet.gov.za/SiteAssets/Latest-News-White-paper-for-post-school-education-and-training.pdf>. Pretoria, South Africa: Department of Higher Education & Training.
- Department of Higher Education and Training. (DHET) 2015. *Statistics on Post-School Education and Training in South Africa: 2014*. Pretoria, South Africa: Department of Higher Education & Training
- Department of Higher Education and Training. (DHET) 2016. *Statistics on Post-School Education and Training in South Africa: 2014*. Pretoria, South Africa: Department of Higher Education & Training.
- Department of Higher Education and Training. (DHET) 2017. *Statistics on Post-School Education and Training in South Africa: 2015* Pretoria, South Africa: Department of Higher Education & Training.

Department of Higher Education. 2018. National list of occupations in high demand, 2018. Government Gazette. Vol. 636, No. 41728.

Dey, I. 1993. *Qualitative Data Analysis: A User Friendly Guide for Social Science*. London: Routledge.

Digregorio, P. & Sobel-Lojeski, K. 2010. The effects of interactive whiteboards (IWBs) on student performance and learning: A literature review. *Journal of Educational Technology Systems*, 38(3):255-312.

Dooley, K. E., Lindner, J. R., Dooley, L. M. & Alagaraja, M. 2004. Behaviorally anchored competencies: Evaluation tool for training via distance. *Human Resource Development International*. 7(3):315-332.

Downes, S. 2007. Msg 1, Re: What Connectivism Is. Online Connectivism Conference: University of Manitoba. Available at:  
<http://lrc.umanitoba.ca/moodle/mod/forum/discuss.php?d=12>

Dunaway, K. M. 2011. Connectivism: Learning theory and pedagogical practice for networked information landscapes. *Reference Services Review*. 39(4):675-685.

Duncheon, J. C. & Tierney, W. G. 2013. Changing conceptions of time implications for educational research and practice. *Review of Educational Research*. 83(2):236-272. 0034654313478492.

Ertmer, P. A. & Newby, T. J. 2013. Behaviorism, Cognitivism, Constructivism: Comparing Critical Features From an Instructional Design Perspective. *Performance Improvement Quarterly*. 26: 43–71. doi:10.1002/piq.21143.

Ewbank, A. D., Foulger, T. S. & Carter, H. L. 2010. Red Bull, Starbucks, and the changing face of teacher education. *Phi Delta Kappan*. 92(2):25-28.

Fisher, G. & Aguinis, H. 2017. Using theory elaboration to make theoretical advancements. *Organizational Research Methods*. 20(3):438-464.

Flick, U. 2014. *An introduction to qualitative research*. Thousand Oaks, CA: Sage.

Ford, N. & Chen, S. Y. 2001. Matching/mismatching revisited: An empirical study of learning and teaching styles. *British Journal of Educational Technology*. 32(1):5-22.

Fredrick, W. C. & Walberg, H. J. 1980. Learning as a function of time. *The Journal of Educational Research*. 73(4):183-194. doi:10.1080/00220671.1980.10885233

Frohberg, D., Göth, C. & Schwabe, G. 2009. Mobile learning projects—a critical analysis of the state of the art. *Journal of Computer Assisted Learning*. 25(4):307-331.

Gandara, P. C. 2000. *The dimensions of time and the challenge of school reform*. State University of New York Press. Albany.

- Garrison, D. R., Anderson, T. & Archer, W. 1999. Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*. 2(2-3):87-105.
- Garrison, D. R., Anderson, T. & Archer, W. 2010. The first decade of the community of inquiry framework: A retrospective. *The Internet and Higher Education*. 13(1-2):5-9.
- Gettinger, M. 1989. Effects of maximizing time spent and minimizing time needed for learning on pupil achievement. *American Educational Research Journal*. 26(1):73-91.
- Gewer, A. 2009. *Features of social capital that enhance the employment outcomes of FET college learners*. Doctor of Philosophy, Faculty of Humanities, University of the Witwatersrand, Johannesburg.
- Gewer, A. 2016. Unfinished business: Managing the transformation of further education and training colleges. In *Change management in TVET colleges. Lessons learnt from the field of practice*. Kraak, A. Paterson, A & Boka, K. Eds. Cape Town, South Africa: JET Education services. 23-46.
- Gibson, W.J. & Brown, A. 2009. *Working with qualitative data*. London: Sage.
- Gikas, J. & Grant, M. M. 2013. Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. *The Internet and Higher Education*. 19:18-26.
- Given, L.M. (ed)., 2008. *The Sage encyclopedia of qualitative research methods*. Vol 2. Los Angeles, Calif.: Sage publications.
- Glaser, B. G. 2007. Constructivist grounded theory? *Historical Social Research/Historische Sozialforschung*. Vol 6 Supplement. 93-105.
- Glaser, B. & Strauss, A. 1967. *The discovery of grounded theory: Strategies for qualitative research* (Reprinted 2006 ed.). London, UK: Aldine Transaction.
- Gold, R. 1958. Roles in Sociological Field Observations. *Social Forces*. 36(3):217-223. doi:10.2307/2573808
- Goldie, J. G. S. 2016. Connectivism: A knowledge learning theory for the digital age? *Medical Teacher*. 38(10):1064-1069.
- Goldkuhl, G. 2004. Meanings of Pragmatism: Ways to conduct information systems research. *Action in Language, Organisations and Information Systems*. 13-26.
- Goldkuhl, G. 2012. Pragmatism vs interpretivism in qualitative information systems research. *European Journal of Information Systems*. 21(2):135-146.
- Gonczi, A. 1994. Competency based assessment in the professions in Australia. *Assessment in Education: Principles, Policy & Practice*. 1(1):27-44.
- Grassian, E. & Kaplowitz, J. 2009. *Information Literacy Instruction: Theory and Practice*, 2<sup>nd</sup> ed. Neal Schuman, New York, NY.

Greenwood, D. J. & Levin, M. 2005. Reform of the social sciences and of universities through action research. In *The Sage handbook of qualitative research*. Denzin, N. K. & Lincoln, Y. S. Eds. 3<sup>rd</sup> Edition. Thousand Oaks, CA:Sage. 43-64.

Guba, E. G. (Ed.) 1990. The alternative paradigm dialogue. In *The paradigm dialogue*. Newbury Park, CA: Sage 17-30.

Guba, E.G. & Lincoln, Y.S. 1998. "Competing paradigms in qualitative research", In *The landscape of qualitative research: Theories and Issues*. Denzin. N. K. & Lincoln, Y. S. Eds. Thousand Oaks, CA: Sage.195-220.

Guba, E.G. & Lincoln, Y.S. 2005. Paradigmatic controversies, contradictions, and emerging confluences, revisited. In *The Sage handbook of qualitative research*. Denzin, N. K. & Lincoln, Y. S. Eds. 3<sup>rd</sup> Edition. Thousand Oaks, CA: Sage. 191-216.

Guest, G., MacQueen, K. M. & Namey, E. E. 2012. *Applied thematic analysis*. Thousand Oaks, CA: Sage

Gunawardena, C. N., Hermans, M. B., Sanchez, D., Richmond, C., Bohley, M. & Tuttle, R. 2009. A theoretical framework for building online communities of practice with social networking tools. *Educational Media International*. 46(1):3-16.  
<http://dx.doi.org/10.1080/09523980802588626>

Hager, P. 1995. Competency Standards – a Help or a Hindrance? An Australian Perspective, *The Vocational Aspect of Education*. 47(2):141-151. DOI: 10.1080/0305787950470203

Hager, P. 2004. The competence affair, or why vocational education and training urgently needs a new understanding of learning. *Journal of Vocational Education & Training*. 56(3):409-433. doi:10.1080/13636820400200262

Hasanefendic, S., Heitor, M. & Horta, H. 2016. Training students for new jobs: The role of technical and vocational higher education and implications for science policy in Portugal. *Technological Forecasting and Social Change*. 113: 328-340.

Heikkinen, A. 1997. Vocational education as a "life-project"? Reflections from the case of Finland. *Journal of European Industrial Training*. 21(6/7):213-219.  
doi:<http://dx.doi.org/10.1108/03090599710171521>

Hernandez, C. A. 2008. Are there two methods of grounded theory? Demystifying the methodological debate. *The Grounded Theory Review*. 7(2):39-66.

Hjørland, B. 2005. Empiricism, rationalism and positivism in library and information science. *Journal of Documentation*. 61(1):130-155.

Huberman, A. M. & Miles, M. B. 1998. Data management and analysis methods. In *Collecting and interpreting qualitative materials*. Denzin, N. K. & Lincoln, Y. S. Eds. London, Sage . 179-210.

Hussey, J. & Hussey, R. 1997. *Business research: A practical guide for undergraduate and postgraduate students*. London: Macmillan Press.

Hyde, K. F. 2000. Recognising deductive processes in qualitative research. *Qualitative market research: An International Journal*. 3(2):82-89.

Imtinan, U., Chang, V. & Issa, T. 2013. Common Mobile Learning Characteristics-an Analysis of Mobile Learning Models and Frameworks. In *Proceedings of The International Conference Mobile Learning 2013*. Sánchez, I. A. & Isaías, P. Eds. 14-16 March, 2013. Lisbon, Portugal. 3-11. IADIS Press.

Jacobson, K. 1980. *The Relationship of Individual Student Time Allocation to Reading and Mathematics Achievement. Report from the Project on Studies of Administration and Organization for Instruction*. Wisconsin Univ. Washington, DC.

Johnson-Laird, P. N. & Byrne, R. M. 2002. Conditionals: a theory of meaning, pragmatics, and inference. *Psychological review*, 109(4):646-678.

Johnson, B. & Turner, L. A. 2003. Data collection in mixed methods research. In *Handbook of mixed methods in social and behavioral research*. Tashakkori, A & Teddlie, C. Eds. Thousand Oaks, CA: Sage 297-319.

Johnson, R.B. & Onwuegbuzie, A.J. 2004. Mixed methods research: A research paradigm whose time has come. *Educational Researcher*. 33(7):14-26.

Kapitan, T. 1990. In what way is abductive inference creative? *Transactions of the Charles S. Peirce Society*. 26(4):499-512.

Karweit, N. 1976. A reanalysis of the effect of quantity of schooling on achievement. *Sociology of Education*. 49(3):236-246. doi:10.2307/2112235.

Karweit, N. 1983. *Time on task: A research review*. Report 332. Baltimore, MD: The John Hopkins University. Center for Social Organization of Schools, Washington DC.

Karweit, N. 1985. Should we lengthen the school term? *Educational Researcher*. 14(6):9-15.

Kayastha, N., Niyato, D., Wang, P. & Hossain, E. 2011. Applications, architectures, and protocol design issues for mobile social networks: A survey. *Proceedings of the IEEE*. 99(12):2130-2158.

Kemmis, S. & McTaggart, R. 2005. Participatory action research: Communicative action and the public sphere. In *The landscape of qualitative research: Theories and Issues*. Denzin, N. K. & Lincoln, Y. S. Eds. 3<sup>rd</sup> Edition. Thousand Oaks, CA: Sage 559-603.

Kemper, E. A., Stringfield, S. & Teddlie, C. 2003. Mixed methods sampling strategies in social science research. In *Handbook of mixed methods in social and behavioral research*. Tashakkori, A. & Teddlie, C. Eds. Thousand Oaks, CA: Sage. 51-89.

Kerr, N. L. & Bruun, S. E. 1983. Dispensability of member effort and group motivation losses: Free-rider effects. *Journal of Personality and Social Psychology*. 44(1):78-94.

Kenny, M. & Fourie, R. 2015. Contrasting Classic, Straussian and Constructivist Grounded Theory: Methodological and Philosophical Conflicts. *The Qualitative Report*. 20(8):1270-1289. Retrieved from <http://nsuworks.nova.edu/tqr/vol20/iss8/9>

- Kincheloe, J. L. & McLaren, P. L. 1998. Rethinking critical theory and qualitative research. In *The landscape of qualitative research: Theories and Issues*. Denzin, N. K. & Lincoln, Y. S. Eds. 3<sup>rd</sup> Edition. Thousand Oaks, CA: Sage. 260-299.
- Kirschner, P. A. & Karpinski, A. C. 2010. Facebook and academic performance. *Computers in Human Behavior*. 26(6):1237-1245. doi.org/10.1016/j.chb.2010.03.024
- Kolfschoten, G., Lukosch, S., Verbraeck, A., Valentin, E. & de Vreede, G. 2010. Cognitive learning efficiency through the use of design patterns in teaching. *Computers & Education*. 54(3):652-660. http://www.sciencedirect.com/science/article/pii/S036013150900270X
- Koole, M. L. 2009. A model for framing mobile learning. In *Mobile learning transforming the delivery of education and training*. Ally, M. Ed. AU Press, Edmonton, Canada. 25-47.
- Koole, M., McQuilkin, J. L. & Ally, M. 2010. Mobile learning in distance education: Utility or futility. *International Journal of E-Learning & Distance Education*. 24(2):59-82.
- Kop, R. & Hill, A. 2008. Connectivism: Learning theory of the future or vestige of the past? *The International Review of Research in Open and Distributed Learning*, 9(3):1-13.
- Koshy, E., Koshy, V. & Waterman, H. 2011. *Action research in healthcare*. London: Sage. . doi: 10.4135/9781446288696
- Kraak, A. 2016. Three decades of restructuring in further education colleges: Divergent outcomes across different global vocational education and training systems. In *Change management in TVET colleges: Lessons learnt from the field of practice*. Kraak, A. Paterson, A & Boka, K. Eds. Cape Town: JET Education Services. 1-22.
- Kreijns, K., Kirschner, P. A. & Jochems, W. 2003. Identifying the pitfalls for social interaction in computer-supported collaborative learning environments: A review of the research. *Computers in Human Behavior*. 19(3):335-353. doi.org/10.1016/S0747-5632(02)00057-2
- Kukulka-Hulme, A. 2005. Introduction. In *Mobile learning: A handbook for educators and learners*. Kukulka-Hulme, A. & Traxler, J. Ed. London and New York: Routledge Falmer. 1-6.
- Latchem, C. 2017a. The Demands and Challenges. In *Using ICTs and blended learning in transforming TVET*. Latchem, C. Ed. Paris 07 SP, France & Burnaby, BC V5H 4M2, Canada: United Nations Educational, Scientific and Cultural Organization (UNESCO) & Commonwealth of Learning (COL). 3-26.
- Latchem, C. 2017b. ICTs, blended learning and TVET transformation. In *Using ICTs and blended learning in transforming TVET*. Latchem, C. Ed. Paris 07 SP, France & Burnaby, BC V5H 4M2, Canada: United Nations Educational, Scientific and Cultural Organization (UNESCO) & Commonwealth of Learning (COL). 27-56.
- Lauglo, J. 2010. Revisiting the vocational school fallacy: a tribute to Philip Foster. *Comparative Education*. 46(2):223-235. Doi:10.1080/03050061003775546

Lavy, V. 2015. Do differences in schools' instruction time explain international achievement gaps? evidence from developed and developing countries. *The Economic Journal*. 125(588):F397-F424. doi:10.1111/eoj.12233

Laurillard, D. 2002. *Rethinking university teaching: A framework for the effective use of educational technology*. Routledge/Falmer: London United Kingdom.

Lee, A. 1991. Integrating Positivist and Interpretive Approaches to Organizational Research. *Organization Science*. 2(4):342-365. Retrieved from <http://www.jstor.org.ezproxy.uct.ac.za/stable/2635169>

Lee, A. S. 2004. Thinking about social theory and philosophy for information systems. In *Social theory and philosophy for information systems*. Mingers, J & Willcocks, L. Eds. The Atrium, Southern Gate, Chichester, West Sussex:John Wiley & Sons. 1-26.

Leech, N. L. & Onwuegbuzie, A. J. 2010. Guidelines for conducting and reporting mixed research in the field of counselling and beyond. *Journal of Counseling & Development*. 88(1):61-69.

Leedy, P. D. & Ormrod, J. E. 2010. *Practical research: planning and design*. 9<sup>th</sup> Ed. Pearson Merrill, Upper Saddle River, New Jersey.

Leedy, P. D. with contributions by Newby, T. J. & Ertmer, P. A. 1997. *Practical research: planning and design*, 6<sup>th</sup> Ed. Pearson Merrill, Upper Saddle River, New Jersey.

LeCompte, M. D. & Goetz, J. P. 1982. Problems of reliability and validity in ethnographic research. *Review of educational research*. 52(1):31-60.

Le Deist, F. D. & Winterton, J. 2005. What is competence? *Human Resource Development International*. 8(1): 27-46. doi.org/10.1080/1367886042000338227

Lewis, T. 2009. Towards reclaiming the high ground in the discourse on vocationalism in developing countries. *International Journal of Educational Development*. 29(6):558-564. doi.org/10.1016/j.ijedudev.2009.01.002

Lipton, M. 1972. Independent bantustans? *International Affairs (Royal Institute of International Affairs 1944-)*. 48(1):1-19. DOI: 10.2307/2613623

Locke, K. & Golden-Biddle, K. 1997. Constructing opportunities for contribution: Structuring intertextual coherence and “problematizing” in organizational studies. *Academy of Management journal*. 40(5):1023-1062.

Lomax, R. G. & Cooley, W. W. 1979. The Student Achievement-Instructional Time Relationship. Paper presented at the annual meeting of the American Educational Research Association. University of Pittsburgh. 63<sup>rd</sup>, San Francisco, CA. April 8-12.

Mansfield, B. 2004. Competence in transition. *Journal of European Industrial Training*. 28(2/3/4): 296-309. doi.org/10.1108/03090590410527672

- Mao, Z., Jiang, Y., Min, G., Leng, S., Jin, X. & Yang, K. 2016. Mobile social networks: Design requirements, architecture, and state-of-the-art technology. *Computer Communications*. 100:1-19. doi: 10.1016/j.comcom.2016.11.006
- Maxcy, S. J. 2003. Pragmatic threads in mixed methods research in the social sciences: The search for multiple modes of inquiry and the end of the philosophy of formalism. In *Handbook of mixed methods in social and behavioral research*. Tashakkori, A. & Teddlie, C. Eds. Thousand Oaks, CA: Sage. 51-89.
- Maxwell, J. A. & Loomis, D. M. 2003. "Mixed methods design: an alternative approach", In *Handbook of mixed methods in social and behavioral research*. Tashakkori, A. & Teddlie, C. Eds. Thousand Oaks, CA: Sage. 51-89.
- McGrath, S. & Akoojee, S. 2009. Vocational education and training for sustainability in South Africa: The role of public and private provision. *International Journal of Educational Development*. 29(2):149-156. doi.org/10.1016/j.ijedudev.2008.09.008
- McGrath, S. 2012. Vocational education and training for development: A policy in need of a theory? *International Journal of Educational Development*. 32(5):623-631. doi:https://doi.org/10.1016/j.ijedudev.2011.12.001
- Mertens, D. 2003. Mixed methods and the politics of human research: The Transformative-Emancipatory perspective. In *Handbook of Mixed Methods in Social and Behavioural research*. Tashakkori, A. & Teddlie, C. Eds. London: Sage. 135-164.
- Miles, B. M., Huberman, M. A. & Saldaña, J. 2014. *Qualitative data analysis: A methods sourcebook*. 3<sup>rd</sup> Edition. Los Angeles: Sage
- Morse, J. M. 1998. Validity by committee. *Editorial Qualitative Health research*. 8:443-445.
- Morse, J. M. 2007. Sampling in grounded theory. In *The Sage Handbook of Grounded Theory*. Bryant, A & Charmaz, K. Eds. Los Angeles, CA: Sage 229-244.
- Ngaleka, A. & Uys, W. 2013. M-learning with WhatsApp: A conversation analysis. *International Conference on e-Learning*. Academic Conferences International Limited. 282-291.
- Ngwenyama, O. 2014. Logical foundations of social science research. In *Advances in Research Methods for Information Systems Research*. Osei-Bryson, K. M. & Ngwenyama, O. Eds. Springer US. Springer Science Business Media New York. 7-13.
- Nonaka, I. & Takeuchi, H. 1995. *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford university press.
- Nowell, S. D. 2014. Using disruptive technologies to make digital connections: Stories of media use and digital literacy in secondary classrooms. *Educational Media International*. 51(2):109-123.
- Nyasulu, C. & Chawinga, D. W. 2019. Using the decomposed theory of planned behaviour to understand university students' adoption of WhatsApp in learning. *E-Learning and Digital Media*. 16(5):413-429. doi: 10.1177/2042753019835906

- Nygaard, C., Højlt, T. & Hermansen, M. 2008. Learning-based curriculum development. *Higher Education*. 55(1):33-50. doi: [10.1007/s10734-006-9036-2](https://doi.org/10.1007/s10734-006-9036-2)
- Oketch, M. O. 2007. To vocationalise or not to vocationalise? Perspectives on current trends and issues in technical and vocational education and training (TVET) in Africa. *International Journal of Educational Development*. 27(2):220-234. doi.org/10.1016/j.ijedudev.2006.07.004
- Okoli, C. & Schabram, K. 2010. A guide to conducting a systematic literature review of information systems research. *Sprouts: Working Papers on Information Systems*. 10(26). doi:[https://www.bvekenis.nl/Bibliotheek/10-0371\\_OkoliSchabram2010SproutsLitReviewGuide.pdf](https://www.bvekenis.nl/Bibliotheek/10-0371_OkoliSchabram2010SproutsLitReviewGuide.pdf).
- Onwuegbuzie, A. J & Leech, N. L. 2005. On becoming a pragmatic researcher: The importance of combining quantitative and qualitative research methodologies. *International Journal of Social Research Methodology*. 8(5): 375-387. doi:10.1080/13645570500402447
- Orlikowski, W. J. & Baroudi, J. J. 1991. Studying Information Technology in organizations: Research approaches and assumptions: *Information Systems Research*. 2(1):1-28. Available: <http://www.jstor.org/stable/23010611>
- Ozanne, J. L. & Saatcioglu, B. 2008. Participatory Action Research. *Journal of Consumer Research*. 35: 423-439. doi: 10.1086/586911
- Palmer, R. 2014. Technical and vocational skills and post-2015: Avoiding another vague skills goal? *International Journal of Educational Development*. 39: 32-39. doi.org/10.1016/j.ijedudev.2014.08.007
- Papier, J. 2009. Getting the right learners into the right programmes: An investigation into factors that contributed to the poor performance of FET college learners in NCV 2 and NCV 3 programmes in 2007 and 2008—Reasons and recommendations. *Report Prepared for the WCED. Cape Town: University of the Western Cape, FETI*.
- Papier, J. & McBride, T. 2018. Systematizing Student Support Services in TVET Colleges: Progressing from Policy. In *Handbook of Vocational Education and Training: Developments in the Changing World of Work*. McGrath S., Mulder M., Papier J. & Suart R. eds. Springer, Cham. 1-15.
- Papier, J., Needham, S. & McBride, T. 2012. Contemporary issues in public FET colleges. *Connecting Capabilities, Individuals and Institutions*. doi:[http://www.lmip.org.za/sites/default/files/documentfiles/Joy Papier Contemporary issues in public FET colleges\\_0.pdf](http://www.lmip.org.za/sites/default/files/documentfiles/Joy%20Papier%20Contemporary%20issues%20in%20public%20FET%20colleges_0.pdf).
- Papier, J., Needham, S., Prinsloo, N. & McBride, T. 2016. Preparing TVET College Graduates for the Workplace: Employers' Views. In *Change Management in TVET colleges. : Lessons learnt from the field of practice*. Kraak, A., Paterson, A. & Boka, K. Eds. Cape Town, South Africa: JET Education Services. 83-102.
- Park, Y. 2011. A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types. *The International Review of Research in Open and Distributed Learning*. 12(2):78-102.

- Pask, G. & Scott, B. 1972. Learning strategies and individual competence. *International Journal of Man-Machine Studies*. 4(3):217-253. doi.org/10.1016/S0020-7373(72)80004-X
- Pate, J., Martin, G. & Robertson, M. 2003. Accrediting competencies: a case of Scottish vocational qualifications. *Journal of European Industrial Training*. 27(2/3/4):169-176. doi: [10.1108/03090590310468976](https://doi.org/10.1108/03090590310468976)
- Paterson, A. 2016. Perspectives on programmes, projects and policies in the TVET colleges. In *Change Management in TVET colleges: Lessons learnt from the field of practice*. Kraak, A., Paterson, A. & Boka, K. Eds. Cape Town, South Africa: JET Education Services. vii-xxiii.
- Peng, S., Yang, A., Cao, L., Yu, S. & Xie, D. 2017. Social influence modeling using information theory in mobile social networks. *Information Sciences*. 379:146-159. doi:<https://doi.org/10.1016/j.ins.2016.08.023>
- Perry, A., Wiederhold, S. & Ackermann-Piek, D. (2014). How to measure skill mismatch? *New Approaches with PIAAC. Methods, Data, Analyses*. 8(2):137-174. doi:10.12758/mda.2014.006
- Plutynski, A. 2011. Four problems of abduction: A brief history. *HOPOS: The Journal of the International Society for the History of Philosophy of Science*. 1(2), 227-248.
- Polster, E., & Polster, M. 1973. *Gestalt therapy integrated: Contours of theory and practice*. Oxford, England: Brunner/Mazel.
- Popper, K. R. (2002). *The Logic of Scientific Discovery*. 2<sup>nd</sup> New Edition. Routledge Classics, London.
- Powell, K. C. & Kalina, C. J. 2009. Cognitive and social constructivism: Developing tools for an effective classroom. *Education*. 130(2):241-251.
- Powell, L. & McGrath, S. 2013. Why students enrol in TVET–The voices of South African FET College Students. *Conference Paper Presented at the Journal of Vocational Education and Training (JVET) Conference, Oxford*. [Http://goo. gl/w27HTC](http://goo.gl/w27HTC).
- Powell, L. 2012. Reimagining the purpose of VET – Expanding the capability to aspire in South African Further Education and Training students. *International Journal of Educational development*.32(5):643-653. doi: [10.1016/j.ijedudev.2012.01.008](https://doi.org/10.1016/j.ijedudev.2012.01.008)
- Proctor, R.W. & Dutta, A. 1995. *Skill acquisition and human performance*. c. Thousand Oaks, CA: Sage.
- Quan-Haase, A., Cothrel, J. & Wellman, B. 2005. Instant Messaging for Collaboration: A Case Study of a High-Tech Firm. *Journal of Computer-Mediated Communication*. 10(4):00-00. doi:[10.1111/j.1083-6101.2005.tb00276.x](https://doi.org/10.1111/j.1083-6101.2005.tb00276.x)
- Rambe, P. & Bere, A. 2013. Using mobile instant messaging to leverage learner participation and transform pedagogy at a South African University of Technology. *British Journal of Educational Technology*. 44(4):544-561. doi: 10.1111/bjet.12057

- Reichertz, J. 2010. Abduction: The logic of discovery of grounded theory. In *The Sage Handbook of Grounded Theory*. Bryant, A & Charmaz, K. Eds. 398-416. Los Angeles, CA: Sage.
- Reigeluth, C. M. & Carr-Chellman, A. A. Eds. 2009. Understanding instructional theory. *Understanding Instructional Theory in Instructional-Design Theories and Models Volume III: Building a Common Knowledge Base*. 3-26.
- Reychav, I., Ndicu, M. & Wu, D. 2016. Leveraging social networks in the adoption of mobile technologies for collaboration. *Computers in Human Behavior*.58:443-453. doi.org/10.1016/j.chb.2016.01.011
- Rice, J. M. 1893. *The public-school system of the United States* New York: Century.
- Rivkin, S.G. & Schiman, J.C. 2015. Instruction time, classroom quality and academic achievement. *The Economic Journal*. 125(F425–F448). doi: 10.1111/eoj.12315
- Robeyns, I. 2006. Three models of education. *School Field*. 4(1):69-84. doi:10.1177/1477878506060683
- Roodt, S., de Villiers, C., Johnston, K., Ophoff, J. & Peier, D. 2014. YouTube as an academic tool for ICT lecturers. *Proceedings of the e-Skills for Knowledge Production and Innovation Conference 2014*, Cape Town, South Africa, 389-399. Retrieved from <http://proceedings.e-skillsconference.org/2014/e-skills389-399Roodt763.pdf>
- Rumrill, P.D., Fitzgerald, S.M. & Merchant, W.R. 2010. Using scoping literature reviews as a means of understanding and interpreting existing literature. *Work (Reading, Mass.)*. 35(3):399-404. doi:10.3233/WOR-2010-0998
- Sakellariou, C. 2006. Benefits of general vs vocational/technical education in Singapore using quantile regressions. *International Journal of Manpower*. 27(4):358-376. doi:http://dx.doi.org/10.1108/01437720610679214
- Saldaña, J. 2016. *The coding manual for qualitative researchers*. 3<sup>rd</sup> Edition: Thousand Oaks, CA: Sage.
- Sandberg, J. & Alvesson, M. 2011. Ways of constructing research questions: Gap-spotting or problematization? *Organization*. 18(1): 23-44. doi:10.1177/1350508410372151
- Saunders, M., Lewis, P. & Thornhill A. 2009. *Research Methods for Business Students*. 5<sup>th</sup> Edition: Pearson Education Limited, London England.
- Sarker, S. & Lee, A. S. 2003. Using a case study to test the role of three key social enablers in ERP implementation. *Information & Management*. 40(8):813-829.
- Schunk, D. H. 2012. *Learning theories: An educational perspective*. Macmillan. 6<sup>th</sup> ed. Inc., publishing as Allyn & Bacon, 501 Boylston Street, Boston, MA, 02116.
- Scott, J. 1990. *A matter of record: Documentary sources in social research*. Polity Press, Cambridge, UK.
- Siemens, G. 2005. Connectivism: Learning as network-creation. *ASTD Learning News*. 10(1).

- Smith, J. & Firth, J. 2011. Qualitative data analysis: Application of the framework approach. *Nurse Researcher*. 18(2): 52-62.
- So, S. 2016. Mobile instant messaging support for teaching and learning in higher education. *The Internet and Higher Education*. 31:32-42. doi: [10.1016/j.iheduc.2016.06.001](https://doi.org/10.1016/j.iheduc.2016.06.001)
- Song, L., Niyato, D., Han, Z. & Hossain, E. 2015. Mobile social networks. In *Wireless device-to-device communications and networks*. Song, L. Niyato, D., Han, Z. & Hossain, E. Eds. Cambridge, United Kingdom: Cambridge University Press. 294-337 doi:[10.1017/CBO9781107478732.011](https://doi.org/10.1017/CBO9781107478732.011) [Retrieved 2017/06/15].
- Spencer, D. H. & Hiltz, S. R. 2003. A field study of use of synchronous chat in online courses. *Proceedings of the 36th Annual Hawaii International Conference on Systems Sciences*. 6-9 January 2003. Big Island, Hawaii. IEEE. 1-10.
- Staat, W. 1993. On abduction, deduction, induction and the categories. *Transactions of the Charles S. Peirce Society*. 29(2):225-237.
- Stallings, J. 1980. Allocated academic learning time revisited, or beyond time on task. *Educational Researcher*. 9(11):11-16.
- Steffens, K. 2015. Competences, learning theories and MOOCs: Recent developments in lifelong learning. *European Journal of Education*. 50(1):41-59.
- Strauss, A. & Corbin., J. 1990. *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.
- Svendsen, L, P.2012. How social media enhanced learning platforms challenge and motivate students to take charge of their own learning processes. In *increasing student engagement and retention using social technologies (Cutting-edge Technologies in Higher Education)*. Wankel, L. A & Blessinger, P. Eds. Volume 6 Part B. Emerald Group Publishing Limited. 57-88.
- Tagg, A. & Dickinson, J. 1995. Tutor messaging and its effectiveness in encouraging student participation on computer conferences. *International Journal of E-Learning & Distance Education*. 10(2):33-55.
- Tam, M. 2000. Constructivism, instructional design, and technology: Implications for transforming distance learning. *Educational Technology & Society*. 3(2):50-60.
- Teddlie, C. and Tashakkori, A. 2003. Major issues and controversies in the use of mixed methods in the social and behavioral sciences. In *Handbook of mixed methods in social & behavioral research*. Tashakkori, A & Teddlie, C. Eds. Thousand Oaks, CA: Sage. 3-50.
- Tharenou, P., Donohue, R. & Cooper, B. 2007. *Management research methods*. Cambridge University Press, Cambridge.
- Tudge, J. R. H. & Scrimsher, S. 2003. Lev S. Vygotsky on education: A cultural-historical, interpersonal, and individual approach to development. In *Educational Psychology: A*

*Century of Contributions*. Zimmerman, B. J. & Schunk, D. H. Eds. Mahwah, NJ: Erlbaum. 207-228.

Thorndike, E. L. 1921. *Educational psychology: The psychology of learning*. Teachers College, Columbia University.

Tikly, L. 2013. Reconceptualizing TVET and development: a human capability and social justice approach. In L Tikly (Ed.), *In Revisiting global trends in TVET: Reflections on theory and practice*. Germany: UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training. UN Campus. 1-39.

Towani, T., Buthelezi, Z. & Wedekind, V. 2016. At the pivot: the classroom experiences of Marketing lecturers in selected TVET Colleges in South Africa. *SAQA Bulletin*.15(1):143-160.

Traxler, J. 2009. Current state of mobile learning. In *Mobile learning transforming the delivery of education and training*. Ally, M. Ed. Edmonton, Canada: AU Press,. 9-24.

Tuckett, A. G. 2005. Applying thematic analysis theory to practice: a researcher's experience. *Contemporary Nurse*, 19:75-87.

Vaismoradi, M., Turunen, H. & Bondas, T. 2013. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & health sciences*, 15(3):398-405. doi/epdf/10.1111/nhs.12048

Velde, C. 1999. An alternative conception of competence: Implications for vocational education. *Journal of Vocational Education and Training*. 51(3):437-447. doi: 10.1080/13636829900200087

Velde, C. & Cooper, T. 2000. Students' perspectives of workplace learning and training in vocational education. *Education Training*. 42(2):83-92. doi:<http://dx.doi.org/10.1108/00400910010331639>

Venkatesh, V., Brown, S. A. & Bala, H. 2013. Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *MIS Quarterly*. 21-54.

Vygotsky, L. S. (1962). Piaget's theory of child language and thought. In *Thought and language*. L. Vygotsky & G, Vakar. Eds, MA, US: MIT Press. doi:10.1037/11193-002. 9-24).

Vygotsky, L. S. 1978. *Mind in society: The development of higher psychological processes*. Cole, M., John-Steiner, V. & Souberman, E. Eds. Boston, MA: Harvard University Press.

Walberg, H. J. 1988. Synthesis of research on time and learning. *Educational Leadership*. 45(6):76-85.

Watson, K. 1994. Technical and vocational education in developing countries: Western paradigms and comparative methodology. *Comparative Education*. 30(2):85-97.

- Webster, J. & Watson, R. T. 2002. Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly*. 26(2): xiii-xxiii.
- Webster, R. E. 1992. *LET-II: Learning efficiency test (1992 revision). manual*. Novato, CA. ERIC.
- Wedekind, V. 2010. Chaos or coherence? Further Education and Training College Governance in Post-Apartheid South Africa. *Research in Comparative and International Education*. 5(3):302-315. doi:10.2304/rcie.2010.5(3):302-315.
- Wedekind, V. 2016. Chaos or coherence? Technical and Vocational Education and Training (TVET) colleges in post-apartheid South Africa. *SAQA Bulletin*. 15(2):85-116.
- Wedekind, V. & Buthelezi, Z. 2016. A Climate for Change? Vertical and horizontal collegial relations in TVET colleges. In *Change management in TVET colleges: Lessons learnt from the field of practice*. Kraak, A., Paterson, A. & Boka, K. Eds. Cape Town: JET Education Services. 64-82.
- Wedekind, V. & Watson, A. 2016. Understanding complexity in the TVET College system: an analysis of the demographics, qualifications, and experiences of lecturers in sixteen TVET Colleges in Gauteng and KwaZulu-Natal. *SAQA Bulletin*. 15(1):61-84.
- Whetten, D. A. 1989. What constitutes a theoretical contribution? *Academy of Management Review*. 14(4):490-495.
- Winch, C. 2013. The attractiveness of TVET. In *Revisiting global trends in TVET: Reflections on theory and practice*. Tikly, L. Eds. Germany: UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training. UN Campus. 86-122.
- Winterton, J., Le Deist, F. & Stringfellow, E. 2005. *Typology of knowledge, skills and competences: clarification of the concept and prototype*. Luxembourg: Office for Official Publications of the European Communities Luxembourg.  
doi:<https://infoeuropa.euocid.pt/files/database/000037001-000038000/000037620.pdf>.
- Yap, B. W. & Sim, C. H. 2011. Comparisons of various types of normality tests. *Journal of Statistical Computation and Simulation*. 81(12):2141-2155.
- Yi, H., Zhang, L., Yao, Y., Wang, A., Ma, Y., Shi, Y., Chu, J., Loyalka, P. & Scott, R. 2015. Exploring the dropout rates and causes of dropout in upper-secondary technical and vocational education and training (TVET) schools in China. *International Journal of Educational Development*. 42:115-123.

## **Internet Sources**

Adu, P. 2017, August 27). *Using Sorting Strategy in Qualitative Analysis*. Retrieved August 26, 2017, from <https://www.slideshare.net/kontorphilip/using-sorting-strategy-in-qualitative-analysis>.

Downes S. 2006. Learning networks and connective knowledge; [cited2015 Aug]. Available from: <http://itforum.coe.uga.edu/paper92/paper92.html>.

Shezi, L. 2016. SA's 26.8 million internet users spend almost three hours a day on social media. Available at <http://www.htxt.co.za/2016/04/29/the-stuff-south-africa-26-8-million-internet-users-spend-most-their-time-doing-online/>

Siemens, G. 2004. "Connectivism: a learning theory for the digital age". Available at [www.elearnspace.org/Articles/connectivism.htm](http://www.elearnspace.org/Articles/connectivism.htm). (Accessed August 2016).

Statistica. 2017. Number of monthly active WhatsApp users worldwide from April 2013 to January 2017 (in millions). Retrieved July 18, 2017, from <https://www.statista.com/statistics/260819/number-of-monthly-active-whatsapp-users/>

Verhagen, P. 2006. Connectivism: A new learning theory? Available online at <http://elearning.surf.nl/e-learning/english/3793> (accessed 2 June 2016).

## Appendix

### Appendix 1: Application for registration as a PhD candidate letter



DOCTORAL DEGREES BOARD  
UNIVERSITY OF CAPE TOWN  
Masigene Building,  
Private Bag X3, Rondebosch, 7701  
Tel: +27 21 650 2202  
E-mail: [ddb@uct.ac.za](mailto:ddb@uct.ac.za)

19 December 2017

STRICTLY CONFIDENTIAL

Mr GP Dzavatsva DZVG0001  
[DZVG0001@uct.ac.za](mailto:DZVG0001@uct.ac.za)

Dear Mr Dzavatsva  
APPLICATION FOR REGISTRATION AS A PHD CANDIDATE

I am pleased to inform you that the DOCTORAL DEGREES BOARD has approved your admission as a candidate for the PhD under the supervision of Dr S Roodt.

The University requires that you are registered for a minimum period of two years, provided you maintain unbroken registration and comply with the rules for the degree. If you first register for the degree after 1 May, you may not count the remainder of the year as part of the minimum prescribed period of study for the programme. Provided you have met with these requirements, the earliest date on which you will be able to graduate is therefore two years after your first registration. I would like to remind you that you must renew your registration every year, not later than the last day of February.

Senate has adopted a set of guidelines for supervision for the information and use of candidates and supervisors. A copy of this is attached and we hope it will be useful.

The rules for the PhD (copy enclosed) give the dates by which you must notify this office of your intention to submit a thesis for examination. Early notification alerts the DOB to prepare for the examination process by getting examiners nominated, approaching them and obtaining their agreement before your thesis arrives. When advising of intention to submit, include the following information - student number, full names, postal address, thesis title, department and name of supervisor/s where any supervisor is not in the same department or at another university please indicate this.

Please note that there is an upper limit of 80 000 words on the main text of your thesis. Any request to exceed this limit must be discussed with the supervisor and final approval must be obtained from the Dean.

We wish you well with your research.

Yours sincerely



Janine Isaacs (Mrs)  
Doctoral Degrees Board Office  
cc: Supervisor: Dr S Roodt, Information Systems  
FACULTY OF COMMERCE  
Ref: CC042017  
Attachment

## Appendix 2: Ethics clearance letter 1



### Faculty of Commerce

Private Bag X3, Rondebosch, 7701  
2.26 Leslie Commerce Building, Upper Campus  
Tel: +27 (0) 21 650 4375/ 5748 Fax: +27 (0) 21 650 4369  
E-mail: [com-faculty@uct.ac.za](mailto:com-faculty@uct.ac.za)  
Internet: [www.uct.ac.za](http://www.uct.ac.za)



@Commerce\_UCT



UCT Commerce Faculty Office

31 May 2018

Dr Godwin Dzvatva  
Department of Information System  
University of Cape Town

REF: REC 2018/005/032

Dear Godwin Dzvatva,

Contextualization of Instructional Time utilising Mobile Social Networks for learning efficiency: A Participatory Action Research Study for Technical Vocational Education and Training learners in South Africa

We are pleased to inform you that your ethics application has been approved. Unless otherwise specified this ethical clearance is valid for 1 year and may be renewed upon application.

Please be aware that you need to notify the Ethics Committee immediately should any aspect of your study regarding the engagement with participants as approved in this application, change. This may include aspects such as changes to the research design, questionnaires, or choice of participants. The ongoing ethical conduct throughout the duration of the study remains the responsibility of the principal investigator.

We wish you well for your research.

Modie Sempu  
Administrative Assistant  
University of Cape Town  
Commerce Faculty Office  
Room 2.26 | Leslie Commerce Building

Office Telephone: +27 (0)21 650 2695/4375  
Office Fax: +27 (0)21 650 4369  
E-mail: [modie.sempu@uct.ac.za](mailto:modie.sempu@uct.ac.za)  
Website: [www.commerce.uct.ac.za](http://www.commerce.uct.ac.za)-<http://www.commerce.uct.ac.za/>

"Our Mission is to be an outstanding teaching and research university, educating for life and addressing the challenges facing our society."

## Appendix 3: Revised ethics clearance letter



### Faculty of Commerce

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E-mail: [com-faculty@uct.ac.za](mailto:com-faculty@uct.ac.za)  
Internet: [www.uct.ac.za](http://www.uct.ac.za)

 @Commerce\_UCT  UCT Commerce Faculty Office

11 October 2018

Dr Godwin Dzvapatsva  
Department of Information  
System  
University of Cape Town

REF: REC 2018/010/114

Dear Godwin Dzvapatsva,

Contextualization of Instructional Time utilizing Mobile Social Networks for learning efficiency: A Participatory Action Research Study for Technical Vocational Education and Training learners in South Africa.

We are pleased to inform you that your ethics application has been approved. Unless otherwise specified this ethical clearance is valid for 1 year and may be renewed upon application.

Please be aware that you need to notify the Ethics Committee immediately should any aspect of your study regarding the engagement with participants as approved in this application, change. This may include aspects such as changes to the research design, questionnaires, or choice of participants.

The ongoing ethical conduct throughout the duration of the study remains the responsibility of the principal investigator.

We wish you well for your research.

Modie Sempu  
Administrative Assistant  
University of Cape Town  
Commerce Faculty Office  
Room 2.26 | Leslie Commerce Building

Office Telephone: +27 (0)21 650 4375  
Office Fax: +27 (0)21 650 4369  
E-mail: [modie.sempu@uct.ac.za](mailto:modie.sempu@uct.ac.za)  
Website: [www.commerce.uct.ac.za](http://www.commerce.uct.ac.za) - <http://www.commerce.uct.ac.za/>

## Appendix 4: Consent form & Information sheet

### Informed Consent Form for

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*This informed consent form is for Computer Programming learners partaking in the research titled: "Contextualization of Instructional Time utilising Mobile Social Networks for learning efficiency: A Participatory Action Research Study for Technical Vocational Education and Training learners in South Africa".*

Name of principle researcher : Godwin Pedzisai Dzvapatsva

Name of University : University of Cape Town

This Informed Consent Form has THREE parts:

- PART 1: Information Sheet (to share information about the study with you)
- PART 2: WhatsApp rules to be observed
- PART 3: Certificate of Consent

Please read the consent form and sign

### Student Information sheet and Consent form

#### Information Sheet & Consent Form

**RESEARCH TOPIC: Contextualization of Instructional Time utilising Mobile Social Networks for learning efficiency: A Participatory Action Research Study for Technical Vocational Education and Training learners in South Africa**

My name is Godwin Pedzisai Dzvapatsva and I am conducting research towards a doctoral degree. My research is on extending instructional time for TVET learners outside the lecture/classrooms. This research has been approved by the Faculty of Commerce Ethics in Research Committee. Permission to carry out the study has also been granted by your college principal. You are free to ask me or anyone before making a decision on taking part in the research. If there are words/ statements that are not clear, please ask me so that I can explain.

I would like to invite you to join the WhatsApp group created for sharing programming content. Your lecturer and a subject expert from the industry OR university will also be requested to join the WhatsApp group. The research will occur in phases with each phase expected to last for one month. I will be documenting my observations from the group discussions as the study proceeds. At the end of each phase, I will request you to complete a questionnaire for the purposes of examining and exploring how instructional time contributes towards learning efficiency for NCV learners in South Africa.

The project entails extending instructional time through WhatsApp with learners studying Computer Programming at TVET colleges so as to inform education policy makers and educators on the possibilities of incorporating technology to improve knowledge, skills and competence of learners. The purpose of the study is to develop an understanding of how instructional time impacts learning efficiency. The information will be obtained through observation on WhatsApp discussions, completing questionnaires at the end of each phase, and analysing documents (registers, record of marks, work based learning reports) which will be requested from the lecturer. Group conversations will be for a month (July 2018) and followed by a questionnaire after. A similar data collection will be carried out in phase two (mid-August to mid-September 2018) in the run up to September internal exams. The last stage will be carried in October in preparation for the final year exams.

Please be informed that your participation in this research is voluntary. You can choose to withdraw from the research at any time without any consequences. However, I would be grateful if you can take part throughout as your participation will go a long way in informing the responsible authorities in assisting learners who need support outside normal teaching periods. During the course of the study, you are expected to post any VB.NET programming questions which are within the scope of your syllabus and fellow group members can respond. Lecturer, researcher and subject experts will post questions and respond to questions on WhatsApp group. Please be informed that you have you are responsible for data bundle costs and there are no reimbursements. Please take note of the WhatsApp group rules attached.

Since the intervention platform is a social one and will be done outside college space, this can have some undesirable effects. By participating in this research, there is a possibility that you will be exposed to such effects. I am aware of instances of peer-bullying associated with WhatsApp, posting content which is not in line with programming and meeting strangers online. It is possible that during the study, the intervention may also cause some challenges that we never anticipated. However, I would like to assure you that the college policy still applies and we will discuss with all participants some of the rules to be observed, copies which will be distributed to all participants.

The researcher and the lecturer will be the ONLY group administrators to avoid issues of having unknown people within the group. Any deviations will be dealt with accordingly with fairness using the college policy. I would like to assure you that appropriate action will be taken on anyone who continues to disregard the rules agreed upon in consultations with the lecturer, student rep and the student himself/herself. I would like to assure you that the researcher will be on top of every situation and monitors the group posts all the time. While I can assure to be on the lookout at all times, please feel free to contact me in cases where you feel that you or other participants have been affected.

Due to the nature of the study you will need to provide the researchers with some form of identifiable information however, all responses will be confidential and used for the purposes of this research only. The researcher will not attempt to identify you with your responses to the questionnaire, or to neither name you as a participant in the study, nor facilitate anyone else doing so. Any information that identifies you will be replaced by codes instead of your name. As the researcher, I am the ONLY person who will know the codes and the information will be kept in secure password protected file. Hard copies will be kept under lock and key. All learners in the class are eligible to take part in the research. Those who decide not to take part will not be affected in any way. All learners willing to participate but are below the age of 18 need to get permission through their parents in order to participate. I have attached a consent form which parents will sign as an acknowledgement for you, if you are below 18 years. The survey

will take approximately 45 minutes. The survey can be found on the following link (to be provided). Please feel free to ask me if you have further questions. Please take note that you will ONLY be allowed to participate in the study if all necessary documents have been signed and submitted to the researcher including parental consent for those below 18 years. Should you have any questions regarding the research please feel free to contact the researcher via email on [dzvgod001@myuct.ac.za](mailto:dzvgod001@myuct.ac.za). Thank you,

*Godwin Pedzisai Dzvapatsva(PhD Candidate)*  
*University of Cape Town*  
*E-mail: [dzvgod001@myuct.ac.za](mailto:dzvgod001@myuct.ac.za)*  
*Mobile: 073 588 7757*

## PART 2

### WhatsApp Group rules

Please make sure you familiarize with the rules below for the benefit of all participants. Apart from the listed rules, RESPECT is to be exercised at all times.

1. Posting times are from 8am to 10 pm. Please refrain from posting outside the given time. Anyone willing to ask questions outside the agreed time can direct the questions to the researcher (Godwin Dzvapatsva).
2. Only group members are expected to contribute in this group. You are not allowed to give a friend to post on your behalf. You will be held accountable for ANY post from your contact number. We request you to re-read your information before sending to avoid harming other group members
3. Any incidents or posts that you do not feel comfortable with should be reported to the group admin. Group admin will deal with issues without identifying you.
4. Since the objective is educational, college rules apply and anyone who is found guilty will be expected to go through the interventions as stated by the colleges.
5. You are free to mute the notifications and read posts when you are free. You can also exit the group without any repercussions.
6. You are also requested to exercise patience in the event that the group members, lecturer or subject expert delays in responding to any questions but be assured that the group admin(s) will definitely respond as soon as they are available.
7. Posts which are religious or political in nature are not tolerated at all. Moreover, ONLY posts related to programming are accepted. Anyone who deviates from the rules will be dealt with by the group admin, lecturer and if need be escalated to college disciplinary committee as per college code of conduct.
8. Avoid personal conversations at all times. Posts should be meant for all group members. In the same context, no- one is allowed to share the contents and contacts of the group with anyone outside the group.
9. Avoid posting very big programming videos as they impact badly on data.
10. Other rules may be added/deleted depending with arising and in consultation with all participants.

Thank you.

**Name of participant** \_\_\_\_\_ (\* Mandatory)

**Signature of participant** \_\_\_\_\_ (\* Mandatory)

**Date** \_\_\_\_\_ (\* Mandatory)

**Day/month/year**

**PART 3: (To signed by the student)**

**“Contextualization of Instructional Time utilising Mobile Social Networks for learning efficiency: A Participatory Action Research Study for Technical Vocational Education and Training learners in South Africa”** research aims at improving learning efficiency for TVET learners through extending instructional time using WhatsApp. This form is to show that you have understood all the implications of taking part in the research.

I the undersigned,..... (your full name)confirm that: (Please tick✓ the box on the extreme right as sign of agreement)

1	I have read the purpose and information relating to me participating in this study	
2	The researcher explained what the research entails and gave me opportunity to ask questions	
3	I will participate on my own accord and can withdraw from the research at any time without any implications on me	
4	Confidentiality of data has been assured before starting the research	
5	I have given the researcher permission to record the interviews during stage 2 and 3.	
6	Data collected will be used for academic purposes and educational improvements only	
7	Due to the nature of the study I will need to provide the researcher with some form of identifiable information however, all responses will be confidential and used for the purposes of this research only.	
8	Having read all the rules, I agree to sign this consent form	

Participant<sup>(Required student’s name)</sup>

\_\_\_\_\_ (Required)

Name of participant

Signature of participant

Date

Researcher



Godwin P Dzvapatsva

31/01/2018

Name of researcher

Signature of researcher

Date

## **Appendix 5: Lecturer semi-structured interview guide**

### **Semi Structured Interview guide**

#### **1. Lecturer demographic data**

- a) Name and Surname
- b) Name of TVET college
- c) Contact Numbers
- d) Gender
- e) Age

#### **2. Personal Skills and subject detail**

- a) What are your skills in the area? Any teacher qualification. Any programming/IT/IS qualification.
  - b) How many years of experience do you have as a Computer Programming lecturer?
  - c) How many hours are you supposed to have for Computer Programming per year. What is the approximate number of hours do you get a year?
  - d) Can you briefly inform us on pass rate for CP learners in general at the college for the past three years? Do you think the learners are performing well? Yes/No. Briefly explain
3. What do you attribute to Learning Efficiency issues associated with NCV particularly in the case of Computer Programming?
  4. What is your perception of instructional time loss by learners during learning time?
  5. What is your perception of instructional time loss by lecturers during learning time?
    - a) Do you record instructional time loss (per individual/class/college)? If you absent do you mark all learners as present for the day which you missed when you come back.
    - b) What does the college do to recover any lost instructional time?
      - i. Any efforts from the College
      - ii. Any efforts from your side as the lecturer.
      - iii. If any, policies in place to guide the conduct and use thereof?
  6. From your experience what has been the major causes of instructional time loss from a student's perspective.
  7. From your experience what has been the major causes of instructional time loss from a lecturer's perspective.
  8. How free are you to communicate with your learners through WhatsApp after classes?

If you are to communicate with your learners outside normal teaching time, what would be the best contact style for positive collaboration?
  9. What are some of your fears/excitement when using WhatsApp with your learners?
  10. What are your reservations on the WhatsApp group that the learners have been using for Computer Programming interactions?
  11. From your observation did you notice activation of muted voices? (Communicative freedom of learners)

12. In your opinion, is there anything that needs to be done (at class level, policy level, college level) to support the use of MSN eg WhatsApp in extending instructional time.
13. Do you think that the incorporation of Mobile Social Network platforms in teaching and learning approach can be used to improve or better learner efficiency?
  - a) If yes, can you elaborate
  - b) If no, Why not?
14. What do you perceive as factors hindering the integration of mobile social networks platforms into the teaching and learning approach?

### **SKILL, KNOWLEDGE & COMPETENCE**

15. Are there any skills that you think learners can benefit through use of MSN (WhatsApp)? (Communication, socialisation, problem solving, critical thinking skills and other).
16. Do you think the execution of the ISAT has shown some untapped skills generated through interaction on MSN platforms or other? Give examples.
17. Comment on the competence of learners on ISAT.
18. From your observation discuss how the learners perceive WhatsApp in sharing knowledge and improving their term mark.
19. Are there any notable improvements that you have witnessed after the introduction of WhatsApp? Please explain your answer by providing examples.

### **MSN FRAMEWORK**

20. What is your take on the development of MSN FRAMEWORK towards extending instructional time?
21. Will you recommend use of WhatsApp to fellow lecturers in addressing learning efficiency through extending instructional time?
22. Please feel free to highlight any other issues within the NCV sector which you feel contribute towards learning efficiency issues at NCV level.

If you feel that your rights have been violated during the research, feel free to contact UCT Ethics committee Litha.Tyulu@uct.ac.za or contact faculty of Commerce directly on the following number +27 (0)21 650 4375

Thank you for your participation in the first round of the study. Summary of the results can be availed to you on request. Feel free to request the summary of findings by contacting me on :

Mobile: 073 588 7757

Email : gpdzvapatsva@gmail.com

## Appendix 6: Learner questionnaire

### INSTRUCTION FOR COMPLETING QUESTIONNAIRE

The questionnaire is divided into two sections as follows:

Section	What is covered
Section A	Biographical information
Section B	Subject topic questions

- 1.1 Please go through all the questions. Mark your choice with an “X” in the box provided with the choice that suit your response.
- 1.2 Some of the questions are open ended so as to give you room to express yourself fully.
- 1.3 Your responses are private and confidential. Results will be used for purposes of this research alone.
- 1.4 Please take note that there are no wrong answers, however give your best honest response.

### SECTION A: BIOGRAPHICAL INFORMATION

2. What is your full name? (Write your answer in the textbox provided)
3. In which area do you stay? (Write your answer in the textbox provided below).
4. What is the name of your institution? (Write your answer in the textbox provided (Optional) (Write your answer in the textbox provided)
5. In which age group do you fall into?

Age group	Mark with an “X” in the row below to indicate your age group
16-20 years	
21-25 years	
26-30 years	
>30years	
Prefer not to say	

6. Indicate your gender

Gender	Mark with an “X” to indicate your answer in the rows below
Male	
Female	
Other	
Prefer not to answer	

**Ownership of mobile devices**

7. What type of mobile device do you use for WhatsApp interactions? (Please type your answer in the textbox provided below).

**MSN Familiarity**

8. Indicate your personal usage experience on the following MSN applications

Application	Mark with an "X"	
	Expert	Novice
WhatsApp		
Telegram		
Viber		
Facebook Messenger		
Mixit		
Other(Please		

**Network Subscription**

9. Which network do you use for WhatsApp? Give a reason? Type your answer in the textbox below.
10. Do you use Wi-Fi hotspot or data bundles for WhatsApp when you are at the college? Provide your answer in the textbox below.
11. Do you use Wi-Fi hotspot or data bundles for WhatsApp when you are at home? Provide your answer in the textbox below.

**Please proceed to SECTION B**

## SECTION B: SUBJECT TOPIC QUESTIONS

### I. Factors contributing to differences in instructional time

For question 1 and 2, please indicate your answer by marking with a letter "X" OR inserting a tick "√" in the box with your choice. "1" indicates Strongly Agree (SA), "2" = Agree (A), "3" = Not Sure (NS), "4" = Disagree (D) and "5" = Strongly Disagree (SD).

#### 12. Internal factors

<b>A lot of instructional time is lost in Computer Programming during college time due to:</b>					
	SA				SD
a) Students late coming	1	2	3	4	5
b) Bunking	1	2	3	4	5
c) Students struggling to understand subject	1	2	3	4	5
d) Lecturers late coming	1	2	3	4	5
e) Student indiscipline	1	2	3	4	5
f) Staff meetings	1	2	3	4	5
g) Student protest action e.g. fees must fall	1	2	3	4	5
h) Poor time table allocation e.g. less time for lab use	1	2	3	4	5

#### 13. External factors

<b>Part of the external causes of instructional time are:</b>					
	SA				SD
a) Service delivery protest	1	2	3	4	5
b) Taxi violence	1	2	3	4	5
c) Train disruptions	1	2	3	4	5
d) No bus fare	1	2	3	4	5
e) Differences in time allocations	1	2	3	4	5
f) Staff meetings	1	2	3	4	5

For question 3a and 3b, please indicate your answer by marking with a letter "X" OR inserting a tick "√" in the box with your choice. The following scale is used "1" indicating 1-15min, "2" = 16-30min, "3" = 31-45min, "4" = 45-60min, "5" = >1 Hour and "6" = Not sure

#### 14. Approximation of time lost per week for Computer Programming.

How many minutes on average do you think you miss per week:						
	1-15min	16-30min	31-45min	45-60min	>1 Hour	Not Sure
a) due to any of the factors highlighted in question 1.						
b) due to any of the factors highlighted in question 2.						

#### 15. Reason for participating

<b>What was your main reason for participating on the WhatsApp group?</b>					
	SA				SD
a) To recover lost time	1	2	3	4	5

b) To share ideas with my classmates pertaining to the subject	1	2	3	4	5
c) To ask important information missed in class	1	2	3	4	5
d) To be constantly in touch with my lecturer for homework purposes	1	2	3	4	5
e) To gain more knowledge on the subject	1	2	3	4	5
f) It's the only time I can be heard by my friends	1	2	3	4	5
g) Just for fun	1	2	3	4	5
h) To improve my interpersonal skills e.g. communication	1	2	3	4	5
i) Just to know what other learners think about the subject	1	2	3	4	5

**16. Challenges in using WhatsApp**

<b>What has been your greatest challenge in using WhatsApp for learning programming</b>					
	SA				SD
a) Not enough data bundles	1	2	3	4	5
b) Some learners use their mother language instead of English	1	2	3	4	5
c) Screen size of my phone limited me	1	2	3	4	5
d) My battery often went flat	1	2	3	4	5
e) Some learners post messages whole day and night	1	2	3	4	5
f) Lecturer presence intimidated me to participate without fear	1	2	3	4	5
g) Some learners are listened to more than others	1	2	3	4	5

**17. Differences in instructional contact style**

<b>I believe WhatsApp :</b>					
	SA				SD
a) Helps learners to understand the subject outcomes	1	2	3	4	5
b) Helps learners to have control of their learning outcomes	1	2	3	4	5
c) Helps learners to predict learning outcomes	1	2	3	4	5
d) Enabled me to operate in the middle ground when communicating with others(Introjecting style)	1	2	3	4	5
e) Helped me to take ownership of my work through participating frequently (Projecting style)	1	2	3	4	5
f) Helped learners to stay focused through the presence of the teacher in the group.(Deflecting style)	1	2	3	4	5
g) Helped me to avoid being overaggressive and holding-in to emotions during discussions for continuity. (Retroflecting style)	1	2	3	4	5
h) Helped me not to lose sight of myself and my needs but also avoided being isolated.(Confluence Style)	1	2	3	4	5
i) Helped me to avoid being oversensitive but instead supportive (Desensitising contact)	1	2	3	4	5

**18. Use of WhatsApp to increase instructional time**

<b>WhatsApp:</b>					
	SA				SD

a) <b>Can assist in increasing contact time outside the college</b>	1	2	3	4	5
b) Collaboration helped me to get all support needed for the subject	1	2	3	4	5
c) Allows instant feedback which is not possible through other platforms	1	2	3	4	5
d) Enabled me to participate in critical engagement for Computer Programming	1	2	3	4	5
e) helped me to get some new tricks not learnt in class	1	2	3	4	5
f) participation is free from bureaucratic ranking of speakers	1	2	3	4	5
g) helps to be in touch with support anywhere anytime.	1	2	3	4	5
h) leaves no questions unanswered	1	2	3	4	5

**19. Use of MSN Framework**

8. In your opinion, what needs to be done to improve learning efficiency of NCV learners for Computer Programming subject? Write your answer on space provided below. (Please note that there is no wrong answer).

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**20. How did the group admin the WhatsApp group manage to control the flow of discussion?**

Write your answer on space provided below. (Please note that there is no wrong answer).

---

**21. WhatsApp perception for learners and lecturers**

	SA				SD
a) I believe WhatsApp is useful in dealing with instructional time discourse when learning CP	1	2	3	4	5
b) I prefer to learn using WhatsApp than other platforms because it's cheap	1	2	3	4	5
c) I prefer to learn /teach using WhatsApp outside class than other platforms because it's cheap	1	2	3	4	5
d) I prefer to learn using WhatsApp outside class than other platforms because it's allows video, voice and text	1	2	3	4	5
e) Using WhatsApp status can reveal what is happening to me to my friends and lectures	1	2	3	4	5

**Skills**

22.

<b>WhatsApp helped me to improve:</b>					
	SA				SD
a) Communication skills	1	2	3	4	5
b) Critical thinking skills needed CP	1	2	3	4	5
c) Problem solving skills needed for CP	1	2	3	4	5
d) Sharing rich and untapped skills through socialisation	1	2	3	4	5
e) Convert untapped knowledge into more meaningful (tacit to explicit)	1	2	3	4	5
f) Emotional skills	1	2	3	4	5

**Competence**

**If you are a lecturer jump to question 13.**

23.

<b>WhatsApp helped me to improve:</b>					
	SA				SD
a) Summative test mark	1	2	3	4	5
b) ISAT mark	1	2	3	4	5
c) Build a good year mark	1	2	3	4	5

24. Should WhatsApp continue to be used by Computer Programming lecturers and students for improving learning efficiency? Yes/No (Highlight your choice)  
Please motivate your answer for your choice in the space below

---

25.

To what extend do you feel that interactions within the WhatsApp group regarding instructional time were					
	SA				SD
a) Worthwhile	1	2	3	4	5
b) Significant	1	2	3	4	5
c) Timely	1	2	3	4	5

26. Should WhatsApp be implemented by other subject lecturers for extending instructional time in their respective disciplines? Yes/No (Highlight your choice)  
Please motivate your answer for your choice in the space below

---

27.

	SA				SD
In your opinion, do you feel that you managed to recover enough instructional time loss during Computer Programming lessons?	1	2	3	4	5

28. In your opinion, do you feel that lecturer presence made a difference to other WhatsApp groups? (Yes/No) Give a reason with examples.

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Feel free to contact if your rights were violated during the research. Participants can contact Faculty EIR committee: Mr Litha Tyulu ([litha.tyulu@uct.ac.za](mailto:litha.tyulu@uct.ac.za)) or call +27 (0)21 650 4375 to speak to any member of the ethics team from the university if you feel your rights have been violated.

Thank you for your participation in the first round of the study. Summary of the results can be available to you on request. Feel free to request the summary of findings by contacting me on:  
Mobile: 073 588 7757  
Email : [gpdzvapatsva@gmail.com](mailto:gpdzvapatsva@gmail.com)

## **Appendix 7: Learner Semi-structured interview guide**

### **Interview Schedule**

*Research Topic: Contextualization of Instructional Time utilising Mobile Social Networks for learning efficiency: A Participatory Action Research Study for Technical Vocational Education and Training learners in South Africa".*

**Informed Consent Form for \_\_\_\_\_**

*This informed consent form is for Computer Programming learners partaking in the research titled: "Contextualization of Instructional Time utilising Mobile Social Networks for learning efficiency: A Participatory Action Research Study for Technical Vocational Education and Training learners in South Africa".* Name of principle researcher  
: Godwin Pedzisai Dzvapatsva

**Name of University : University of Cape Town**

**Informed consent has been signed at the beginning of the study.**

- Information Sheet (to share information about the study with you)
- Interview guide (Questions to be asked will be along the frames provided. However the interviewer might ask for more clarity on each of the questions.)

**Please read the consent form and sign**

## **Information Sheet & Consent Form**

### **RESEARCH TOPIC: Contextualization of Instructional Time utilising Mobile Social Networks for learning efficiency: A Participatory Action Research Study for Technical Vocational Education and Training learners in South Africa**

My name is Godwin Pedzisai Dzvapatsva and I am conducting research towards a doctoral degree. My research is on extending instructional time for TVET learners outside the lecture/classrooms. The purpose of the interview is to examine the lecturers' observation with regards to learning efficiency of students taking part in the study.

The project entails extending instructional time through WhatsApp for the purposes with learners studying Computer Programming at TVET colleges so as to inform education policy makers and educators on the possibilities of incorporating technology to improve knowledge, skills and competence of students.

The purpose of the study is to develop an understanding of how instructional time impacts learning efficiency. I am interested in finding out the potential of WhatsApp in extending instructional time. I would like to investigate whether extending instructional time helps to improve learning efficiency.

Please be informed that your participation is voluntary and you can withdraw from the research at any time without any consequences. I would like to record the discussion so that I can use it for future reference when writing findings. If you grant permission to record the conversation, you have the right to cancel recording permission at any time. However, I would be grateful if you allow the full recording of the interview.

The study has no known risks and confidentiality with regards to how responses will be preserved. There are no known risks or dangers to you associated with this study, and the researchers will not attempt to identify you with your responses to the questions asked during the interview, or to name you as a participant in the study, nor will they facilitate anyone else's doing so. Please take note that permission has been sought from college principal and the university ethics committee to conduct the study.

The interview will take approximately 20 minutes during the last week of October. Exact dates and venue for interview will have to be agreed upon between interviewer (researcher) and interviewee (lecturer).

Please feel free to ask me if you have further questions. You can contact me via email on [gpdzvapatsva@gmail.com](mailto:gpdzvapatsva@gmail.com)

Thank you,  
*Godwin Pedzisai Dzvapatsva*  
*PhD Candidate*  
*University of Cape Town*  
*E-mail: [gpdzvapatsva@gmail.com](mailto:gpdzvapatsva@gmail.com)*

**“Contextualization of Instructional Time utilising Mobile Social Networks for learning efficiency: A Participatory Action Research Study for Technical Vocational Education and Training learners in South Africa”** research aims at improving learning efficiency for TVET learners through extending instructional time using WhatsApp. This form is to show that you have understood all the implications of taking part in the research.

I the undersigned, (.....) confirm that: (Please tick the box on the extreme right to show that you agree with the statement)

1	I have read the purpose and information relating to me participating in this study	
2	The researcher explained what the research entails and gave me opportunity to ask questions	
3	I will participate on my own accord and can withdraw from the research at any time without any implications on me	
4	Confidentiality of data has been assured before starting the research	
5	Data collected will be used for academic purposes and educational improvements only	
6	My personal details are optional and will not be used in any way in the research if provided	
7	I give permission for the following information to be included in the publications resulting from this study:  b) Direct quotes	
8	Having read all the rules, I agree to sign this consent form	

Participant

\_\_\_\_\_

Name of participant

Signature of participant

Date

Researcher



Godwin P Dzvapatsva

31/01/2018

Name of researcher

Signature of researcher

Date

## Semi Structured Interview guide

### Biographical information of interviewee

1. Name, Surname, and institution name .....
2. Age range : 16-20, 21-25, 26-30, >30, Prefer not to say
3. Gender : Male/Female/Other/ Prefer not to say
4. Highest qualification prior to NCV: (Grade 9, 10, 11, 12 or other courses)

### **RQ1**

5. From your observation, do you think you managed to recover part of the lost time through WhatsApp chat meant for Programming? Elaborate your answer?
6. Have you experienced any improvements in performance (ICASS ) since the introduction of WhatsApp?

**SUB Question 1: What are the key factors contributing to differences in instructional time?**

7. In term 3, did you have any instructional time loss? Elaborate your answer.

**SUB Question 2: How does the different Instructional Time style affect learning efficiency?**

8. What contact style do you feel that your lecturers must adopt on WhatsApp?

**SUB Question 3: How can MSN be used to increase Instructional Time?**

9. When questions were asked on Whatsapp, where did you look for answers?
10. Were you able to identify the person giving most of the correct answers?
11. How clear were the contributions which you received through Whatsapp chat?

### **Challenges**

12. What are some of the factors that contributed to your limited/unlimited contribution on the WhatsApp group?

**SUB Question 4: How can an integrated mobile learning model guide TVET practitioners and policy makers in addressing Instructional Time issues?**

13. Were you comfortable with the way how the discussions were done (guidelines and rules)? Elaborate your answer?
14. Do you have any suggestions on what colleges should do to support the WhatsApp groups meant for teaching and learning?

**SUB Question 5: To what extent do learners and lecturers perceive the usefulness of MSN in dealing with instructional time discourse for learning purposes?**

15. How free were you to contribute to the Computer Programming discussions on WhatsApp?
16. What do you think you might have benefited through participation on WhatsApp?(skill/ knowledge/competence)
17. In your opinion, do you think it is important to form such networks as the one implemented in the current study? Elaborate your answer
18. Please feel free to share your experiences for this WhatsApp group.

Thank you. If you feel that your rights have been violated during the research, feel free to contact UCT Ethics committee faculty of Commerce directly on the following number +27 (0)21 650 4375

Thank you for your participation in the first round of the study. Summary of the results can be availed to you on request. Feel free to request the summary of findings by contacting me on :

Mobile : 073 588 7757

Email : gpdzvpatsva@gmail.com

Interview Schedule

**Research Topic: Contextualization of Instructional Time utilising Mobile Social Networks for learning efficiency: A Participatory Action Research Study for Technical Vocational Education and Training learners in South Africa**

<b>Name of Interviewee</b>	
<b>Date</b>	
<b>Time</b>	
<b>Organisation</b>	
<b>Designation of interviewee</b>	
<b>Venue</b>	
<b>Interviewer</b>	Godwin P Dzvpatsva

Special notes

.....  
 .....

Signature of interviewee ..... Date .....

Signature of interviewer ..... Date .....

## Appendix 8: Friedman Anova test for individual colleges

### BC Theory Statistics using Friedman Anova and Kendall Coefficient of Concordance

	Anova Chi Sqr. (N =12, df =2) =20.167; Kendal W=.840; Asymp. Sig =.000 (p-value <.05; reject null hypothesis)		
Variable	Mean ranks	Std Deviation	Mean
Theory Test 1	2.92	9.577	69.50
Theory Test 2	2.00	12.046	58.75
Internal Exam	1.08	12.0343	47.625

### BC Practical Statistics using Friedman Anova and Kendall Coefficient of Concordance

	Anova Chi Sqr. (N =12, df =2) =12.696; Kendal W=.529; Asymp. Sig =.002 (p-value <.05; reject null hypothesis)		
Variable	Mean ranks	Std Deviation	Mean
Practical Test 1	2.67	17.443	80.67
Practical Test 2	2.08	10.138	79.33
ISAT	1.25	11.839	67.83

## SC College

### SC Theory Statistics using Friedman Anova and Kendall Coefficient of Concordance

	Anova Chi Sqr. (N =10, df =2) =7.400; Kendal W=.370; Asymp. Sig =.025 (p-value <.05; reject null hypothesis)		
Variable	Mean ranks	Std Deviation	Mean
Theory Test 1	2.30	27.933	51.60
Theory Test 2	1.30	13.563	40.20
Internal Exam	2.40	16.7644	58.400

### SC Practical Statistics using Friedman Anova and Kendall Coefficient of Concordance

	Anova Chi Sqr. (N =10, df =2) =2.526; Kendal W=.126; Asymp. Sig =.283 (p-value >.05; return null hypothesis)		
Variable	Mean ranks	Std Deviation	Mean
Practical Test 1	2.40	37.236	69.60
Practical Test 2	1.80	15.204	75.40
ISAT	1.80	10.721	74.40

**FB1****FB1 Theory Statistics using Friedman Anova and Kendall Coefficient of Concordance**

Anova Chi Sqr. (N =20, df =2) =14.179; Kendal W=.354;

Asymp. Sig =.001

**(p-value <.05; reject null hypothesis)**

<b>Variable</b>	<b>Mean ranks</b>	<b>Std Deviation</b>	<b>Mean</b>
Theory Test 1	1.98	15.754	65.10
Theory Test 2	2.60	14.634	71.20
Internal Exam	1.43	25.2522	49.900

**FB1 Practical Statistics using Friedman Anova and Kendall Coefficient of Concordance**

Anova Chi Sqr. (N =20, df =2) =.338; Kendal W=.008; Asymp.

Sig =.845

**(p-value >.05; return null hypothesis)**

<b>Variable</b>	<b>Mean ranks</b>	<b>Std Deviation</b>	<b>Mean</b>
Practical Test 1	2.10	18.516	64.30
Practical Test 2	1.98	19.773	59.60
ISAT	1.93	31.375	61.50

**FB2****FB2 Theory Statistics using Friedman Anova and Kendall Coefficient of Concordance**

Anova Chi Sqr. (N =28, df =2) =3.720; Kendal W=.066;

Asymp. Sig =.156

**(p-value >.05; retain null hypothesis)**

<b>Variable</b>	<b>Mean ranks</b>	<b>Std Deviation</b>	<b>Mean</b>
Theory Test 1	2.04	13.069	58.93
Theory Test 2	2.23	8.745	60.39
Internal Exam	1.73	17.164	51.32

**FB2 Practical Statistics using Friedman Anova and Kendall Coefficient of Concordance**

Anova Chi Sqr. (N =28, df =2) =14.439; Kendal W=.258;

Asymp. Sig =.001

**(p-value <.05; return null hypothesis)**

<b>Variable</b>	<b>Mean ranks</b>	<b>Std Deviation</b>	<b>Mean</b>
Practical Test 1	1.71	7.531	58.86
Practical Test 2	1.79	7.529	59.21
ISAT	2.50	18.731	60.75

## CC

### CC Theory Statistics using Friedman Anova and Kendall Coefficient of Concordance

Anova Chi Sqr. (N =19, df =2) =9.579; Kendal W=.252;

Asymp. Sig =.008

**(p-value <.05; reject null hypothesis)**

<b>Variable</b>	<b>Mean</b>	<b>Std Deviation</b>	<b>Mean</b>
	<b>ranks</b>		
Theory Test 1	1.68	11.800	64.84
Theory Test 2	1.74	11.600	66.32
Internal Exam	2.58	8.4742	75.316

### CC Practical Statistics using Friedman Anova and Kendall Coefficient of Concordance

Anova Chi Sqr. (N =19, df =2) =3.391; Kendal W=.089;

Asymp. Sig =.183

**(p-value >.05; return null hypothesis)**

<b>Variable</b>	<b>Mean</b>	<b>Std Deviation</b>	<b>Mean</b>
	<b>ranks</b>		
Practical Test 1	2.24	7.880	83.89
Practical Test 2	1.68	8.126	80.42
ISAT	2.08	6.199	82.26

**Appendix 9A: Decision Table for Legitimation of Proposition 2  
legitimation**

<b>College</b>	<b>Conditions</b>			<b>Action</b>
	<b>Strong Lecturer presence</b>	<b>Strong Learner presence</b>	<b>Learner-lecturer relationship</b>	<b>MSN usage for extending instructional time</b>
FB1	Yes	Yes	Yes	High
FB2	Yes	Yes	No	High
CC	Yes	Yes	Yes	High
SC	Yes	Yes	Yes	High
BC	Yes	No	Yes	Low

**Appendix 9B: Decision Table for Proposition 3 legitimation on contact  
style**

	<b>Conditions</b>	<b>Action</b>
	<b>Matching Lecturer-Student contact styles</b>	<b>MSN participation</b>
FB1	No	High
FB2	No	High
CC	No	High
SC	No	High
BC	No	Low

## Appendix 10: Learning theories

Criteria	Behaviourism	Cognitivism	Constructivism	Connectivism
<b>a)Proponents</b>	Burrhus F Skinner, Ivan Pavlov. John Watson	Levy Vygotsky, Jerome Brunner	Jean Piaget, John Dewey Maria Montessori Jerome Brunner	David Siemens,
<b>b)Philosophical assumption</b>	Objectivists: World is real external of learner	Objectivists	Subjectivists- knowledge cannot be separated from the knower.	Pragmatic assumption- Reality is interpreted (Siemens,2005) Knowledge is negotiable
<b>c)How Does learning occur?</b>	Emphasis on observable behaviour with learner reacting to environment.	Emphasis is on meaning and semantics (knowledge schema).	Emphasis is on task, learner and environment interaction.	Learning occurs through interaction with nodes in networks.
<b>d)Role of memory and motivation</b>	Little focus on memory despite the emphasis on recalling of facts. The use of rewards/punishments.	Reliability on organisers to link previous knowledge with current situations is essential (Ertmer & Newby, 2013).	Relies on interpretation and elaboration. Prior knowledge critical in evaluation of current situations.	Memory provides the skill for identifying patterns within networks
<b>e)How does transfer of knowledge occur?</b>	Generalisation, pre-assessment, reinforcement and feedback. Advocates for mastery learning.	uses feedback to guide and support accurate mental connections, elaboration	Advanced knowledge Acquisition. Emphasis on critical reasoning and experience	The strength and reliability of the nodes determine the chance to grow.
<b>f)Principles/Assumptions</b>	Pre-assessment, mastering at each stage, aim to achieve observable and measurable outcomes(Ertmer & Newby, 2013:49)	Identification of relationships between previous and current contexts.	Multiple perspective and construction of new ones based on experiences.	Competence can be achieved through links to the correct nodes.
<b>g)Knowledge:</b>	Result from automatic response to external factors (environment)	Knowledge results from individual acquisition and reorganising information based on prior knowledge	Knowledge results from critical thinking and as well as experiences.	Since knowledge can reside in machines and database, those with access to such environments have potential to have it.
<b>h)Weaknesses:</b>	Fails to sufficiently explain meaning making at higher levels like generating inferences and critical thinking	Overlook on consequences that reinforce, sustain or weaken behaviour.	Customisation of tasks based on prior knowledge can be problematic.	Assumption of ability to identify networks overgeneralised.

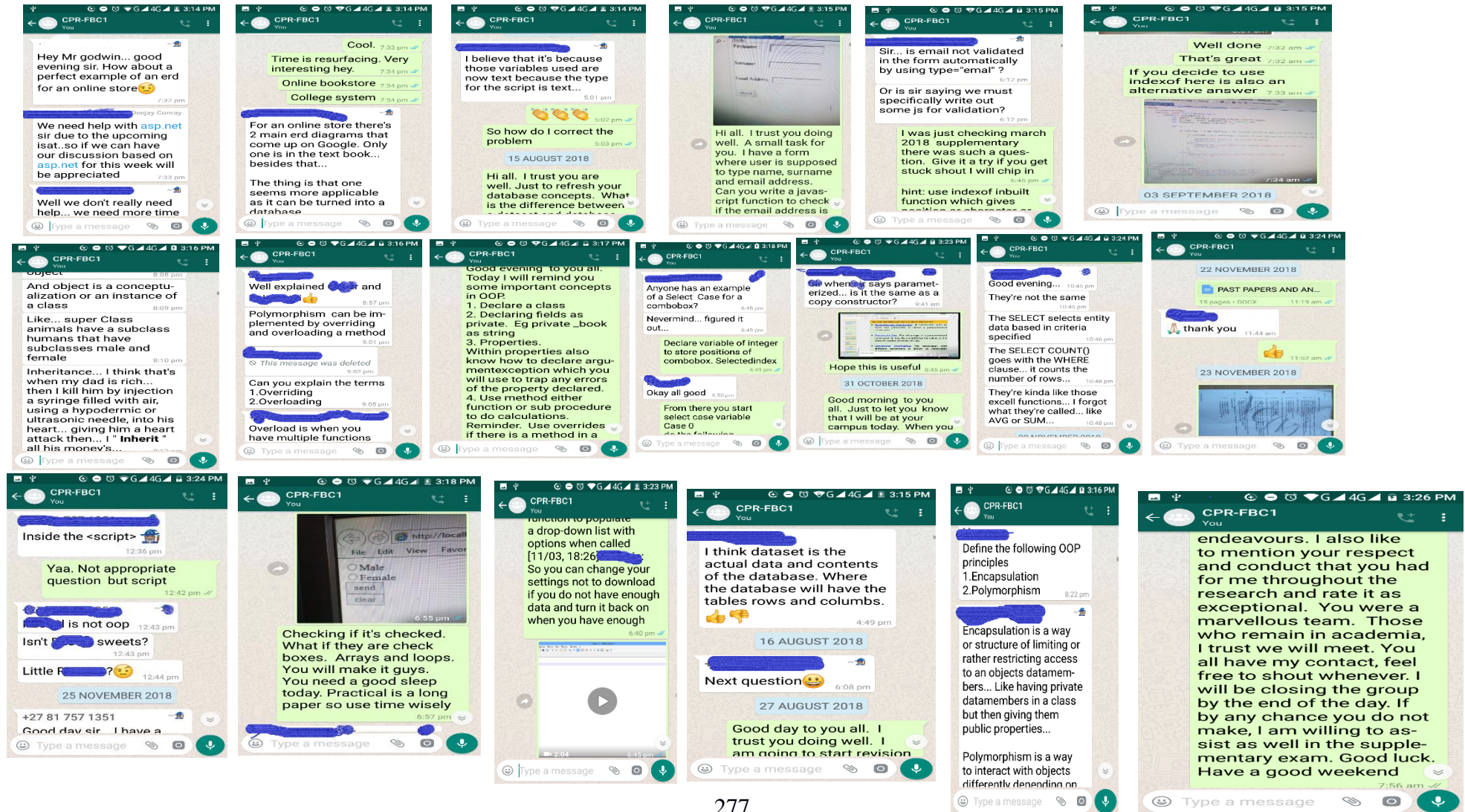
Learning Theories 1: (Source: Siemens, 2004; Schunk, 2012; Ertmer & Newby, 2013)

## Appendix 11: Comparative analysis on paradigms

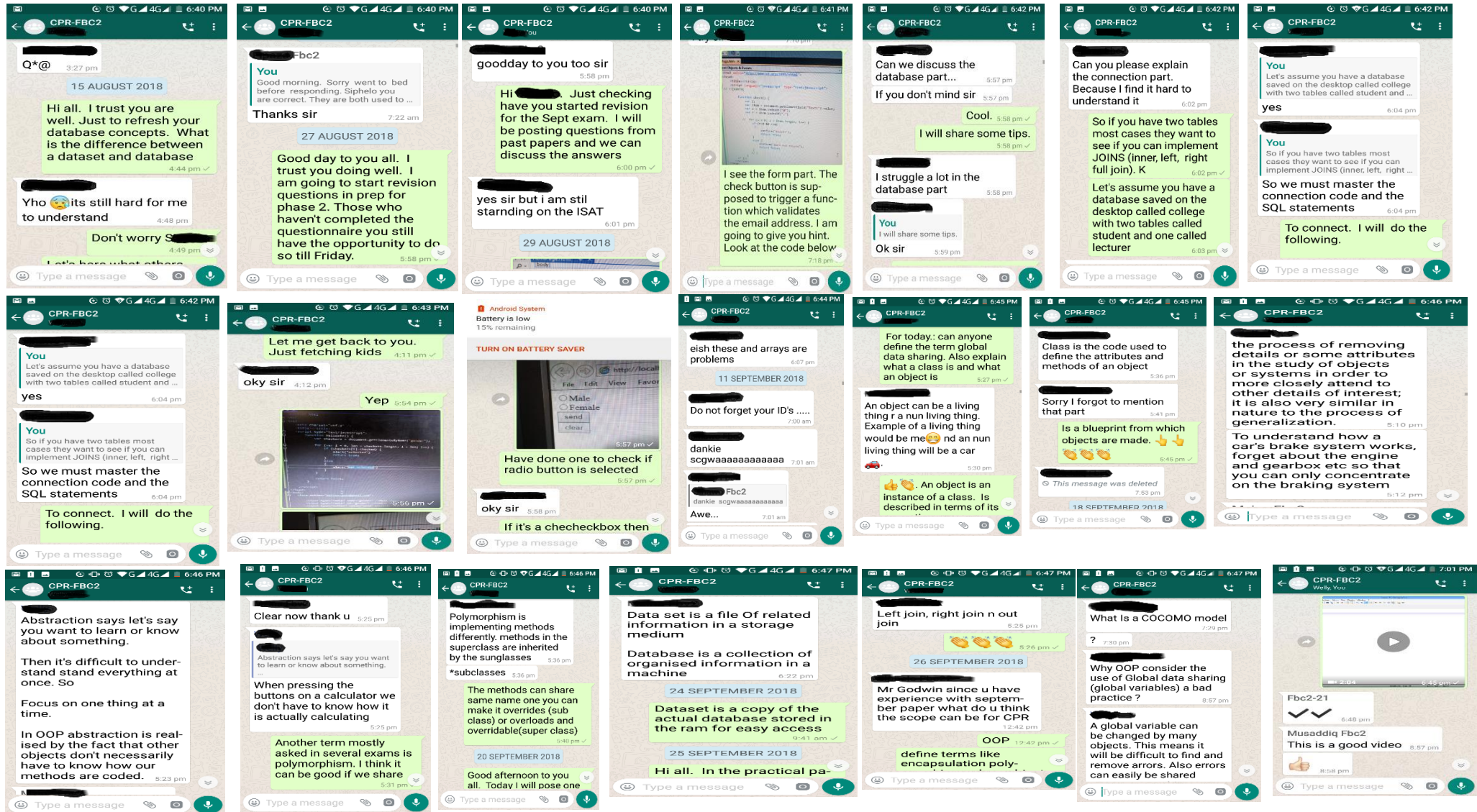
Criteria	Positivism	Interpretivism	Critical theory (CT)	Pragmatism
<b>Proponents</b>	Popularised by Auguste Comte (1798-1857). Notable positivists include David Hume (1711 –1776), Émile Durkheim (1858–1917) John Stuart Mill (1806–1873).	Wilhelm Dilthey (1833-1911), Max Weber (1864-1920) and Peter Winch (1926-1997).	Max Horkheimer (1895-1973); Herbert Marcuse 1898 –1979; Theodore W. Adorno 1903-1969 and Jurgen Habermas (1929- )	Charles Sanders Pierce (1839-1914), William James (1842-1910), George Herbert Mead (1863-1931) and later John Dewey (1859-1952).
<b>Assumptions</b>	Objectivists: World is real external of researcher -value free (Hussey and Hussey, 1997; Guba & Lincoln, 1998). Positivists’ believe in scientific laws for explaining phenomena on the basis that knowledge resulting from scientific process is positive and accurate (Crotty, 1998; (Cohen et al., 2007). Reality is fixed. Measuring facts is crucial for validity and reliability. Associated with quantitative data	Subjectivists- Researcher cannot be separated from the society-value laden. Society keeps changing and so is reality. More interested in understanding phenomena. interpretivist seeks to find understanding (Blaikie, 1993; Blumberg et al., 2008). Inherently associated with qualitative data putting more emphasis on dependability of the outcome.	In its ontology, CT put emphasis on historical realism. As time progresses structures are shaped by politics, culture, gender, economy and ethnicity. Critical theorists suggest that reason is the only way humans can critique society and its status quo (Blaikie, 1993) leading to empowerment (Guba & Lincoln, 1998). Critical theorists suggest transactional and subjectivity ontology. Value laden- bias reduced through spending time (Mertens, 2003). Dialogue between the subjects and investigator results in critical thinking over time (Guba & Lincoln 1998; Crotty, 1998)	Pragmatic assumption- Reality is what works (Maxcy, 2003). Knowing and action cannot be separated.
<b>Strength</b>	Positivism remains a good paradigm for inquiries that focus on measure, validity and reliability. Positivism is best suited for situations where time is an issue and in such instances cross sectional studies can be executed (Hussey & Hussey, 1997).	Credibility achieved through member-checking.	Researchers (Kincheloe & McLaren, 1998; Mertens 2003) suggest that critical theory works well where importance is on marginalised people which is not the case of the current study.	Not constricted by philosophical assumptions. Links theory and practice. Use of mixed methods allows lessening of weaknesses of quantitative or qualitative data
<b>Weakness</b>	Separation of researcher from the researched is questionable (Guba & Lincoln, 1998; Given, 2008). Over-commitment to generalizability may lead to abstraction. Positivism falls short of mirroring how people experience and deal with the world (Given, 2008).	A major criticism of interpretive paradigm stems from lack of generalisations since data is collected from few cases (Blumberg et al., 2008). Over-reliance on interpretive paradigm renders some general theories useless as there are no fixed regulations in interpretations and understanding (Given, 2008).	One of the criticism levelled on critical theory is on Habermas separation of natural science and social science (Blaikie, 1993). Separation of knowledge generated is blurred.	Delayed results (incremental change)

<b>Reasons for non-adoption in current study</b>	Empirical data can not sufficiently reveal facts but only confirm agreed facts by group of researchers. Rejected on the basis of separation of knowledge and practice.	In the current study, interpretive paradigm falls short in linking practice to theory and as such it is not adopted in the current study.	NCV learners are not typically marginalised hence not adopted in the current study. Assuming that the study was carried just after attaining independence in South Africa, then critical theory would have its space since a lot of learners were affected by laws like Bantu Education Act of 1953 (Gewe, 2009).
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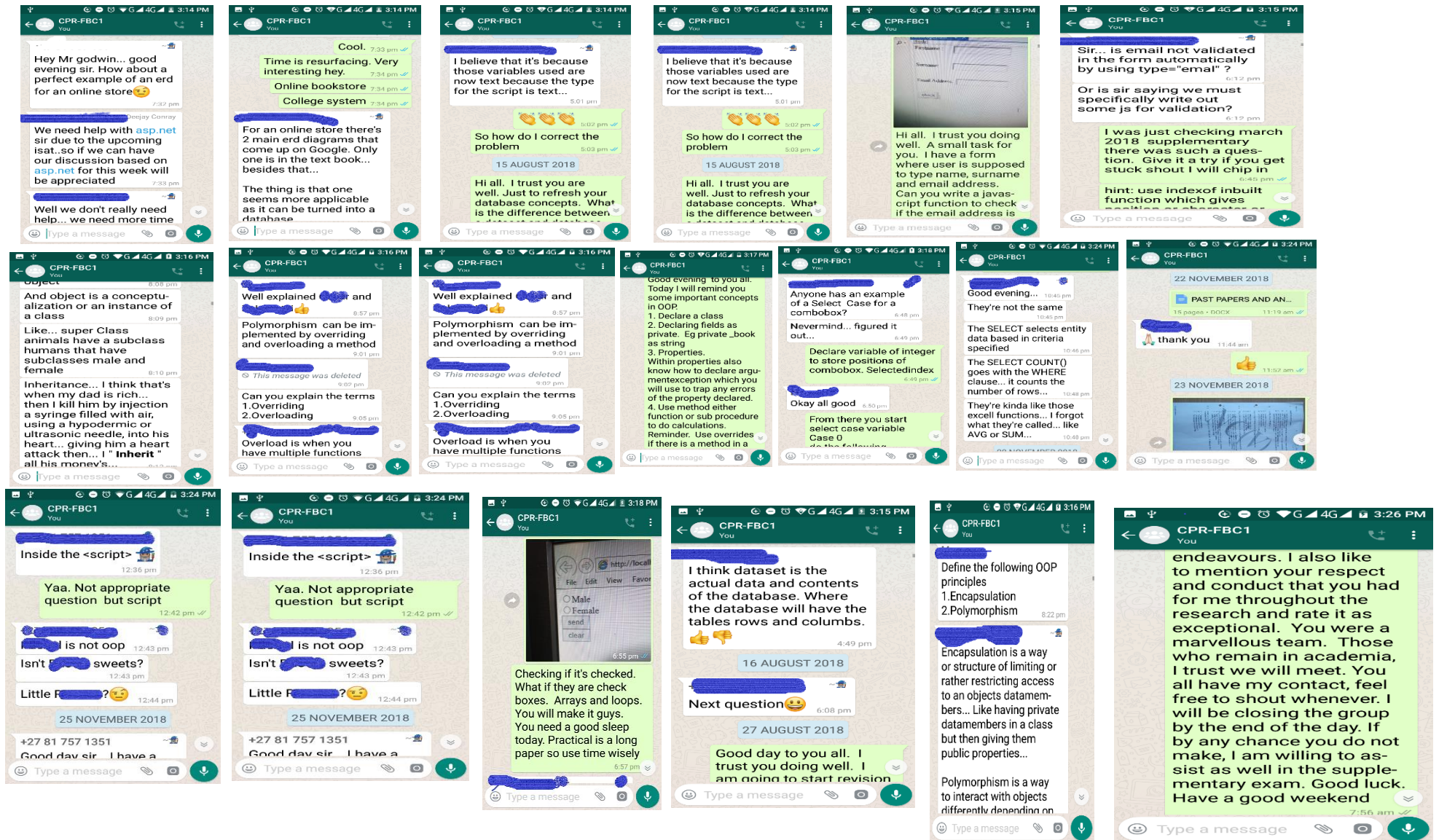
## Appendix 12A: Extracts from FB1 WhatsApp Conversations



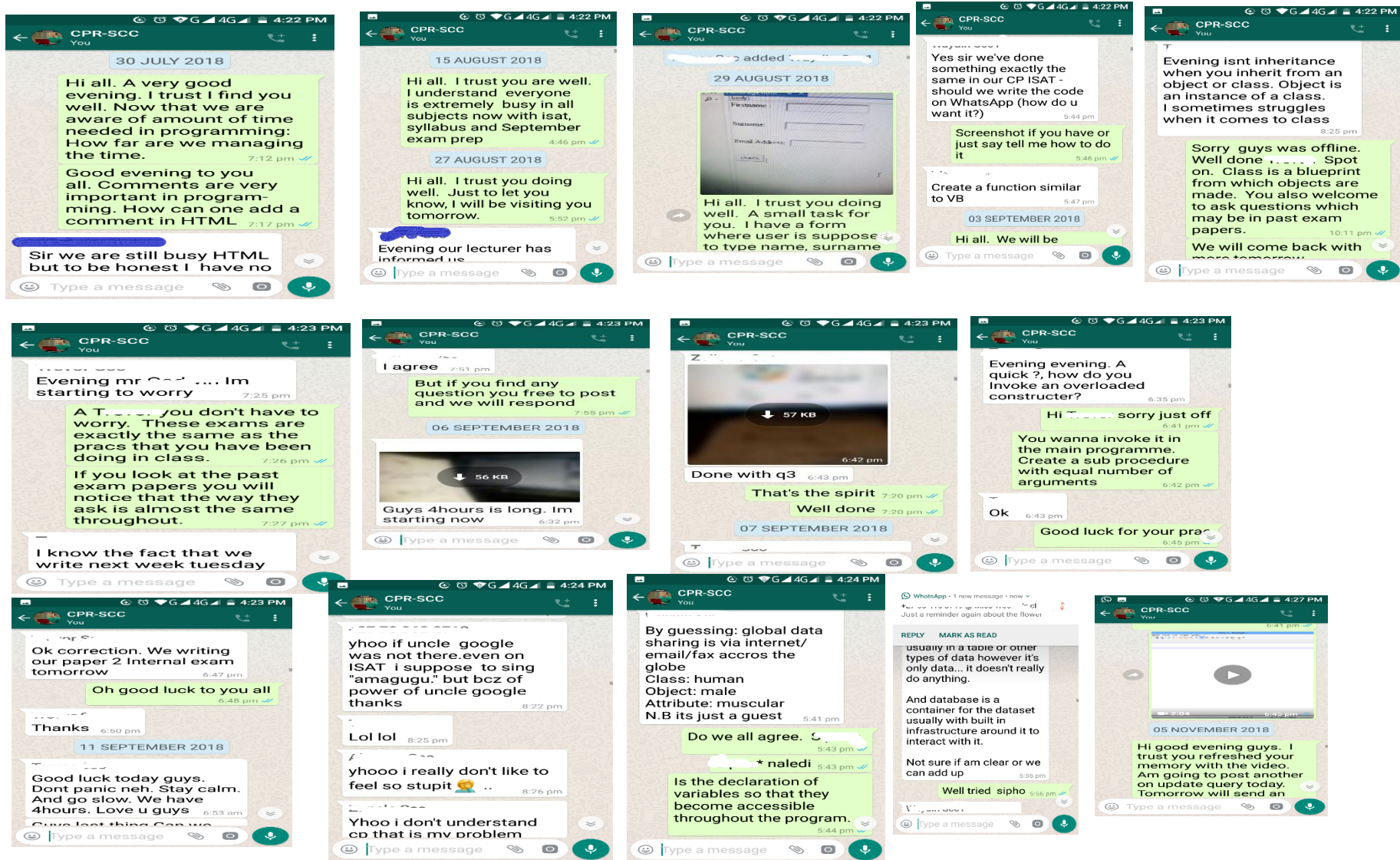
## Appendix 12B: Extracts from FB2 WhatsApp Conversations



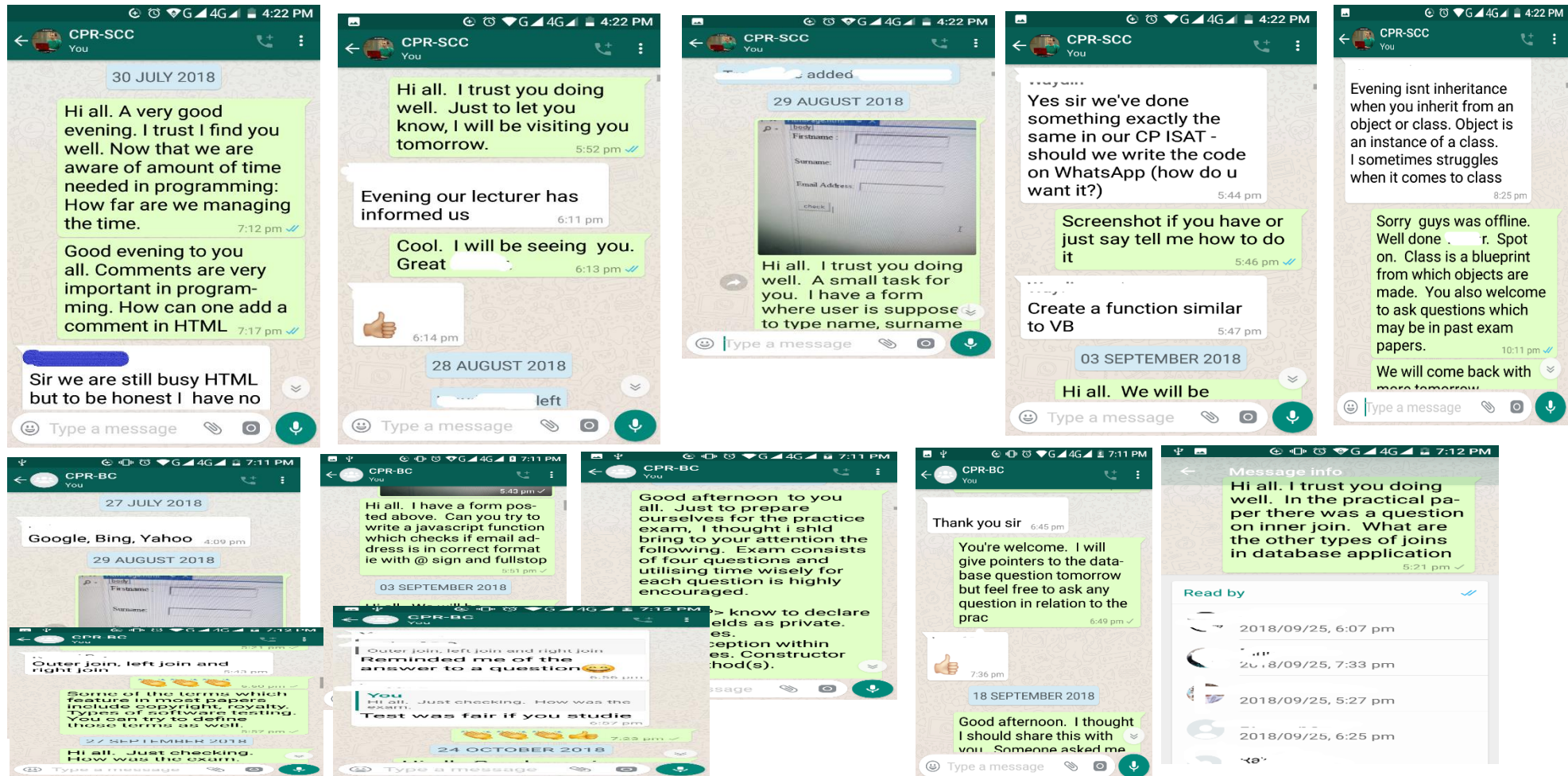
## Appendix 12C: Extracts from CC WhatsApp Conversations



## Appendix 12D: Extracts from SC WhatsApp Conversation



## Appendix 12E: Extracts from BC WhatsApp Conversation



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