The Impact of Using Mobile Technology on

Omani Science Teachers' Reflective Practices and Their Motivation

Towards Teaching and Planning Lessons

Abdulmajeed Hussein Mohammed Al Bahrani

PhD

University of York

Education

May 2019

Abstract

Mobile technologies, especially smartphones, are globally popular, including amongst teachers. Thus, it could be very helpful for in-service teacher training providers to use such technologies in developing teachers' practices. This study describes using smartphones as a platform for teachers' professional development. It reveals levels of reflective practices, and motivation towards teaching and planning lessons, of Omani in-service science teachers, and it explores effects of the professional development on these characteristics. A training programme was designed, based on models of reflection (Kolb's and Gibb's Cycles) and on the Expectancy-Value theory of motivation, and hosted on Facebook and Twitter. The programme aim was to improve teachers' reflective practices and motivation. This study took place in the Al Batinah-North Governorate of the Sultanate of Oman. 83 Omani science teachers were involved over approximately 14 weeks. A pre-post experimental design ensured accurate assessment of the mobile technology programme's effects. Interviews, questionnaires, and document analyses were employed in order to obtain data. The findings were that Omani science teachers believe that they are at a medium level, on a five-point scale, in respect of reflective practices. However, some evidence shows that their reflective practices might objectively be less than this. They self-report a level higher than medium in motivation towards teaching and planning lessons. The results indicate that Omani female science teachers practise reflection and are motivated towards planning lessons significantly more than their male counterparts. There is a positive, but not statistically significant, impact of mobile technology use on the teachers' reflective practices and motivation towards teaching and planning. Furthermore, there is a positive relationship between teachers' reflective practices and their motivation towards planning lessons. Influences on Omani science teachers' reflective practices and motivation are: professional development methods, workload in relation to focus of attention and to time, and teachers' personality traits.

Table of Contents

Chapter One: Introduction

Chapter two: Literature Reviews

Chapter Three: Research Methodology

Chapter Four: The Development of the Study Intervention

Chapter Five: Effects of the Intervention on Reflective Practices

Chapter Six: Effects of the Intervention on Motivation

Chapter Seven: Influences on teachers' reflective practices and their motivation

Chapter Eight: Discussion of Findings

Chapter Nine: The Conclusion

List of Tables

List of Figures

Acknowledgements

First of all, I'm so grateful to the Almighty Allah for his great support to accomplish this thesis. Then, I would like to show my great, sincere, and warm thanks to my supervisors who are the real factor to make this thesis possible. My first gratitude goes to my chief supervisor Dr. Jeremy Airey who stood on my side with clear guidance and real supports during this long journey. In fact, I learned a lot from him, especially, how could I become a reflective learner? My second gratitude goes to my Thesis Advisory Panel member Professor Judith Bennett who also enriched my study with very useful feedback. Furthermore, I would like to show my gratitude to Emma Marsden who enhanced the quality of the study with her useful and important ideas. Finally, my grateful thanks go to my family who encouraged me to be a Ph.D. student at this prestigious University (University of York).

Declaration

I declare that this thesis, entitled: **"The Impact of Using Mobile Technology on Teachers' Reflective practices and Their Motivation Towards Teaching and Planning Lessons"** *is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as References.*

Dedication

I dedicate this thesis to:

    The souls of my beloved mother and my beloved father.

      My sons and daughters.

        My brother and sisters.

          My wife.

Chapter One: Introduction

1.1 Introduction

The present study reveals the extent to which Omani science teachers are reflective and motivated towards teaching and planning lessons. It also explores the potential of utilising mobile technologies, especially smartphone devices, in Omani in-service teachers' professional development programmes. It focuses mainly on two variables (reflective practices and motivation) that are considered as important elements in teachers' professional development. The current chapter starts with the study's outline and its background. It then presents the context of the study. Next, this chapter presents an overview of teachers' professional development in Oman. It reveals the importance of the teachers' professional development and the reality of its implementation in Oman. Following that, it presents the rationale of the study, and finally, this chapter shows the study aims and its questions.

1.2 The Study Outline

The current study includes nine chapters. This first chapter provides the study outline, the background, and the context of the study. It also addresses Omani in-service teachers' professional development. Furthermore, it shows the rationale of the study. Finally, it shows the study's aims and questions.

The following chapter, the literature review, addresses the theoretical frameworks related to the study variables - mobile technology, reflective practices, and motivation. Then, it presents empirical studies related to the study variables.

Chapter Three consists of two main sections, the methodological framework, and the methodology (the processes). The content of the first section describes the research design, the rationale behind using a mixed method approach, the population of the study and its sample, and the data collection techniques. The following section addresses the procedures of the study, the data analysis, the reliability and validity of the qualitative data, and the ethical considerations.

Chapter Four describes the path of the study intervention development. It also shows, in detail, the procedures and the activities of the pilot study and the main study. Furthermore, it explains and justifies the way the activities were designed.

Chapters Five, Six, and Seven address the results of the study. These chapters present both the quantitative and the qualitative findings. Chapter Five shows the results relating to teachers' reflective practices, and gives answers to the extent to which Omani science teachers are reflective. It also gives answers regarding the effects of the intervention on teachers' reflective practices. For that purposes, it relies on evidence from the interview data, the standardized measures data, and analysing teachers' activities. Chapter Six shows the results relating to teachers' motivation. It gives answers to the extent to which Omani science teachers are motivated towards teaching and planning lessons. It also provides an answer regarding the effects of the intervention on teachers' motivation towards teaching and planning lessons. For that purpose, it relies on evidence from the interview data, the standardized measures data, and analysing teachers' activities. Chapter Seven addresses the influences on Omani science teachers' reflective practices and their motivation towards working as teachers. It first analyses the association between the reflective practices of Omani science teachers and their motivation towards teaching and planning lessons. It then goes on to discuss the influences that affect teachers' reflective practices and their motivation towards working as teachers.

Chapter Eight, the discussion chapter, is devoted to discussing the study's questions. It begins with presenting the study's key findings. The chapter is then split into three major sections. The first one addresses Omani science teachers' reflective practice levels. It also discusses the outcomes regarding the impacts of the study intervention on Omani science teachers' reflective practices. The second section discusses Omani science teachers' motivation levels, and the outcomes connected to the impacts of the study intervention on their motivation towards teaching and planning lessons. The final section discusses influences that affect Omani science teachers' reflective practices and their motivation.

Chapter Nine starts with summarising the aims and results of the study. It then goes on to address its contributions and implications in the educational field. Next, the study limitations and further research recommendations are presented. Finally, the chapter presents the final conclusion of the study.

1.3 Background

In 1986, the Sultanate of Oman opened its first state-owned university, the Sultan Qaboos University. The researcher conducted a study which showed the possibility of employing online technology in teachers' professional development when studying at this

university, which contributed to developing the educational system in Oman. The university consists of nine colleges, one of which is the College of Education, which has been crucial in preparing Omani teachers. The use of the internet was provided at the university in 1997, and since then it has been considered as a vital factor for enhancing students' learning (Al-Kindi and Al-Suqri, 2017). This university, as with many other universities and institutions around the world, has attempted to incorporate online learning services with its courses by adopting the use of Learning Management Systems (LMS), such as WebCT and Moodle (Al-Kindi and Al-Suqri, 2017). The utilisation of e-learning at the university began in 2001 (Al Musawi and Abdelraheem, 2004), and since then the university has led the process of merging digital learning in the Omani educational system. The Moodle LMS was employed by the majority of educators at the university, from 2005, in order to underpin their efforts to gain a high standard of quality in students' learning (Al-Kindi and Al-Suqri, 2017).

Various studies, such as Ahmed and Al-Khanjari's (2011) study, have attempted to understand students' attitudes towards using Moodle as a learning platform, and its impact on their learning. The researcher was one of the first educators who tried to explore these impacts, especially with pre-service teachers. In 2008, whilst working in his part-time role as a practical education inspector at the College of Education at Sultan Qaboos University, he conducted a study which aimed to identify the impact of e-supervision, by using Moodle as a supervision tool, on pre-service teachers' practices and reflection. The findings indicated that using Moodle as a platform to support teachers' reflection affected their reflection levels positivly and significantly (Al Bahrani, 2008).

1.4 The Context of the Study

Oman is the second Gulf Cooperation Council (GCC) state in terms of area size (land area equal to 309.500 Km^2), with quite a small density of population. It is located in the Middle East as a part of the Arabian Peninsula, where it is bordered by three Arabian countries, the United Arab Emirates, Saudi Arabia, and Yemen (Al Shabibi and Silvennoinen, 2018). Administratively, Oman consists of 11 governorates, including its capital (Muscat) (Ministry of Education, 2008). According to the United Nations Development Programme (2010), Oman was the leader out of 135 countries in the world for the improvement in the Index of the Human Development. For decades, this country has exploited its wealth, which comes from oil, in education and health (United Nations Development Programme, 2010). Thereby, it witnessed a comprehensive evolution in all sectors, especially in the educational sector.

Al Shabibi and Silvennoinen (2018) divide the Omani development in the educational sector into three stages, starting in 1970, when His Majesty Sultan Qaboos bin Said became the leader of Oman. He promised to attain a comprehensive reform in the country in all sectors, particularlly in the educational sector. Therefore, his government paid close attention from the beginning to building and expanding the educational infrastructure (Al Shabibi and Silvennoinen, 2018).

The second stage began in the mid 1990's where sustained efforts was made in order to enhance education system quality (Al Shabibi and Silvennoinen, 2018). Alshandudi (2017) argues that there were significant external and internal factors that encouraged policymakers to reform the Omani educational system. These factors are globalization, an increase in economic competition between countries, pressures from media and outcomes of evaluation reports, the need to develop a knowledge–based economy, and social and economic development (Alshandudi, 2017).

Before educational reform in Oman, the educational system was represented by general education, which consisted of three main stages (Ministry of Education, 2008). These stages were *"Primary (Grades 1-6), Preparatory (Grades 7-9), and Secondary (Grades 10-12)"* (Al-Farsi, 2007, p.20; Ministry of Education, 2008). Before the second year in the secondary stage, pupils had to choose between the path of arts or science (Al-Farsi, 2007). It seemed that this educational system was not sufficient to encounter 21st Century challenges (Al-Maamari, 2014). Thus, the recent educational reform took place in 1998, and general education was replaced by another system which consisted of basic education and post-basic education (Ambusaidi and Al-Farei, 2017).

In fact, reform in the Omani educational system occurred as a result of the 2020 Vision for Oman's Economy conference in 1995 (Al Barwani, 2002). This vision, which strived to provide suitable conditions for continuous development in Oman's economy, focused on human resource development to attain this purpose (Al Barwani, 2002). Thus, the quality of teachers was a vital element that policymakers had to consider when embarking on educational reform. They were clearly aware of the importance of providing excellent teachers for the purpose of gaining success in the system of education (Imran, Allil, and Mahmoud, 2017). During the 1970's, most teachers had a very low level of qualifications. In fact, the percentage of teachers who had a university degree was only 8 per cent (Al Shabibi and Silvennoinen, 2018). After this period, attempts to enhance the educational system with qualified teachers from other countries continued. In 1980, 92 per cent of teachers who

delivered education in Oman were non-national (Chapman, Al-Barwani, Al Mawali and Green, 2012). Today, education is delivered by a large group of qualified Omani teachers. There are more than 47 thousand (84 per cent) qualified Omani teachers, and the majority of them (94.77 per cent) have at least a university degree or higher (Ministry of Education, 2018).

In 1970, Oman only had 900 male pupils (no female pupils) studying in only three schools (Al Jabri, Silvennoinen and Griffiths, 2018; Ministry of Education, 2008). In these schools there were only 30 teachers (Ministry of Education, 2008). Today, there are more than 1125 public schools, with more than 56,000 teachers working with more than 579,000 pupils (Ministry of Education, 2018). The Ministry of Education was compelled to review the educational system due to the continuing pupils' low academic outcomes (Al Shabibi and Silvennoinen, 2018; the Ministry of Education and the World Bank, 2012). Teachers were one of the main reasons behind this issue (Al Shabibi and Silvennoinen, 2018). According to the Ministry of Education and the World Bank (2012), many of them lacked pedagogical skills and therefore needed to train in this aspect that deals with this issue practically, and not theoretically. Teachers stayed away from applying the approach that puts pupils as the centre of learning, and they followed teacher-centred learning (Al Shabibi and Silvennoinen, 2018).

1.5 Omani In-service Teachers' Professional Development

Professional development is the *"processes and activities that are designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students"* (Guskey, 2000, p.16). Many hopes are attached to teachers' professional development in order to obtain high quality teaching processes (Bicaj and Treska, 2014). It is crucial to improving teachers' quality as this is a key element regarding pupils' learning achievements worldwide (Amadi, 2013; the Ministry of Education and the World Bank, 2012).

In fact, any educational reform does not take place without dealing with this aspect (Guskey, 2000). Continuous educational reforms are important in order to deal with the rapid growth of knowledge and to allow teachers to acquire the needed skills for implementing any new approaches or strategies (Guskey, 2000). Field (2011) argues that knowledge acquisition and skills development are key outcomes of teachers' professional development programmes. In many countries, professional development programmes rely on a traditional model that involves receiving well-structured and prepared knowledge (Park and So, 2014). Teachers

participate in these programmes that include attending workshops and classes in order to gain knowledge from experts (Park and So, 2014). Some of these programmes are rarely planned according to teachers' needs. The continuous needs of teachers must be taken into consideration, especially in the context of constant changes in the society that lead to increasing demands on teachers (Dadds, 2014).

In Oman, educational inspectors usually nominate those who can attend these programmes and because of their constant shift between schools each year, some teachers can repeatedly attend a programme that they have previously attended. Adding to this narrow view, there are other views of teachers' professional development programmes. One such view involves teachers striving to receive an advanced degree by enrolling in graduate courses (Alyahmadi and Al-Kiyumi, 2014; Guskey, 2000). In fact, the teaching profession, due to its complexity, may involve teachers continuing to acquire many qualifications throughout their careers (Alyahmadi and Al-Kiyumi, 2014).

Recently, based on that view, the Ministry of Education in Oman has established a training centre called "The Specialised Centre for Professional Training of Teachers". This centre allows Omani science teachers to enrol in a two-year programme consisting of four training periods (each period lasts for five days) where the programme targets science teachers in second cycle schools (Al Jabri, et al., 2018; Ministry of Education, 2016). This programme generally aims to enhance the competencies of teachers in teaching and learning in order to become leaders of change in their field (Ministry of Education, 2016). It involves three fundamental elements: *"face-to-face teaching, online learning, and workplace learning"* (Al Jabri, et al., 2018, p.89).

The first year focuses on the development of knowledge and on the understanding of theories and best practices according to the global standards in teaching and learning (Ministry of Education, 2016). Furthermore, it places emphasis on methods of teaching science based on asking questions, applying concepts, higher thinking skills and problem-solving methods (Ministry of Education, 2016). The second year focuses on developing the skills of teachers in order to enable them to become leaders (Ministry of Education, 2016).

In spite of the services provided by this centre, many questions may arise in terms of the possibility of its continuity, due to its high budget requirements. In addition, during their experience at this centre, teachers are only trained for a certain time period. This period of time could be enough for changing some of the teachers' values and beliefs, but it is unclear

if it is sufficient to form the desired high-quality teachers. Adding to this, the capacity of these programmes is limited. So far, after one year, only 3639 teachers have been enrolled from all disciplines, which merely represent 6.45 per cent of the overall teachers' number in Oman (Ministry of Education, 2016).

1.5.1 Training of Omani in-service teachers

Omani in-service teachers have opportunities to attend different professional development programmes, such as training programmes run by schools, training programmes carried out by Regional Training Centres, and training programmes carried out by the Ministry's Human Resources Development Directorate (the New Zealand Education Consortium and the Ministry of Education, 2017). These programmes mainly consist of short workshops and courses that are usually conducted during school time where transport, meals and accommodation are supplied (the Ministry of Education and the World Bank, 2012). According to the Ministry of Education and the World Bank (2012), trainers and policymakers argue that teachers do not take training seriously despite the Ministry of Education often providing training requirements.

As previously mentioned, educational inspectors choose teachers without taking their needs into account, which led to some teachers complaining that they are being sent on training courses that are unsuitable for their needs (the Ministry of Education and the World Bank, 2012). The Ministry of Education and the World Bank (2012) stated that in a survey carried out by the Ministry of Education in 2009 in five educational districts, in-service teachers noted that training usually focuses on theoretical aspects, and does not focus on the problems that they face. They also pointed out that trainers are not qualified. School principals, in the same survey, complained that in addition to the fact that these courses are limited in terms of their benefits because they are short-term courses, they contribute to a disruption in the educational process in the school, due to the difficulties in finding cover for the absent teacher.

1.6 Rationale of the Study

The researcher realised after conducting the previous study (the impact of e-supervision, by using Moodle as a supervision tool, on pre-service teachers' practices and reflection) that digital learning or internet-related technology plays a vital role to foster learning among pre-service science teachers. However, during that period, a question was raised about how we could utilise this useful technology effectively in regard to in-service

Omani science teachers' professional development, where their workload is high and where Moodle is not provided for those teachers, and also when their motivation to be involved in such a programme might be low.

1.6.1 Potential of using mobile technology approaches for the purpose of teachers' professional development in Oman

Preparing and implementing teachers' professional development programmes in Oman are generally two of the main duties of educational inspectors (Ministry of Education, 2005). An Omani inspector is defined as *"a person who is responsible for monitoring teachers who are in their field and his/her duty to enhance their professional development according to the philosophy of Omani ministry of education"* (Al Hajri, 2014, p.4). The Al Batinah-North Governorate is one of the largest areas in Oman, hence the distance between some of the schools of the governorate and the available centre of training where most of the teachers' education programmes are offered, is too long. For instance, the distance between Al Suwayq city and that centre is about 103 Km.
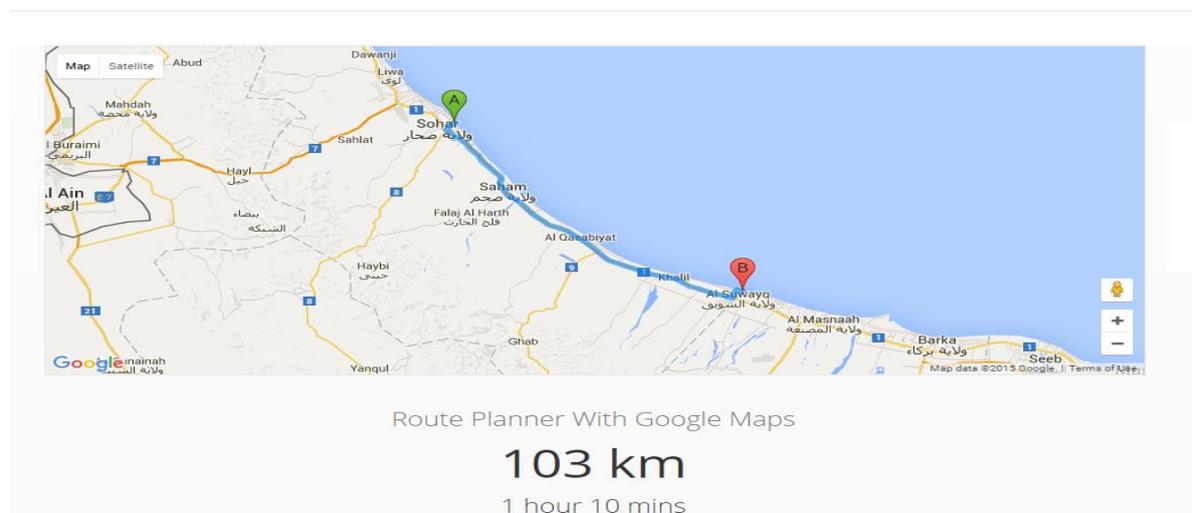
Figure1.1 The distance between Sohar City (Training Center) and Al Suwayq City. Retrieved from http://www.entfernungsrechner.net/en/distance/city/286282/city/288955 on 28/12/2015

Thus, many science inspectors struggle to plan and implement educational programmes for professional development purposes. Indeed, the issue of the distance is one of the main obstacles for them. It is not reasonable to expect teachers to make such a long and inconvenient journey in order to join the educational training programmes, especially if the programme takes place over a long period of time. This can also negatively affect science teachers' plans of implementing lessons, especially if they are unaware of these programmes'

schedules in advance. For that reason, it seems reasonable to suggest that science inspectors employ internet-related technology in dealing with teachers' professional development issues.

It seems that this type of technology can be applied, whilst many of the previously raised obstacles can be addressed. First, National Centre for Statistics and Information (2018) estimates the population of Oman in 2018 to be 4.66 million inhabitants. Approximately, 3.31 million inhabitants (69 per cent) of them use the internet (Internet World Stats, 2017). Furthermore, Moodle platforms or online technology can be replaced with mobile technology. Today, mobile technology plays a significant part in connecting people all over the world, overcoming the barriers of time and distance. According to Statista (2018a) and GSMA Intelligence (2018), users of mobile phones have reached approximately 5 billion of the world's 7.63 billion population. Thereby, 65 per cent of people around the world enjoy the benefits of mobile technology. This technology has the potential to underpin learners with high-quality learning experiences and it has the adaptation ability for the growing requirements for mobility and flexibility (Alrasheedi and Capretz, 2013).

The rise of mobile technology, such as smart phones and tablets, has created a rich environment for promoting m-learning, inside the classroom and outside the classroom, through the advantages of this technology to enhance communication, dialogue, and collaboration among learners (Al-Kindi and Al-Suqri, 2017). Kukulska-Hulme and Traxler (2005) believe that mobile technology provided hope of providing *"independent investigations, practical fieldwork, professional updating, and on-the-spot access to the knowledge"* (p.26). Furthermore, many studies' findings (Aubusson, Schuck and Burden, 2009; Ekanayake and Wishart, 2015; Len-Kibinkiri, 2014) have encouraged the utilisation of this technology in teachers' professional development.

Facebook, Twitter and WhatsApp are examples of some of the online applications that are hosted by mobile technology. According to Statista (2018b) and Statista (2018c), there were 2.19 billion monthly active users of Facebook, and 336 million monthly active users of Twitter worldwide in the first quarter of 2018, which shows a huge spread of such social media platforms. Empirical studies such as (Bista, 2015; Blair, 2013; da Cunha Junior, Van Oers and Kontopodis, 2016; Ebner, Lienhardt, Rohs and Meyer, 2010; Kajornboon, 2013; Sirivedin, Soopunyo, Srisuantang and Wongsothorn, 2018) show a significant positive impact of Facebook and Twitter on teachers' professional development and on educational processes.

Oman has two mobile network operators, and the cost of mobile broadband services is less than the average cost in the Arabian countries (International Telecommunication Union, 2017). The Omani mobile network is considerably advanced. It generally covers the country with 3G service (International Telecommunication Union, 2017). The World Bank (2017) has shown that Oman's cellular subscription has reached 6.94 million. This number is greater than the actual population of Oman, which is just 4.66 million (National Centre for Statistics and Information, 2018). Clearly, the figures show that mobile technologies have a huge presence in Oman, and thus Oman is able to take full advantage of these technologies in the educational sector.

Reflective practices, where individuals' reliance on learning by recalling and reviewing their past experiences, rather than relying on the formal theoretical learning, is another component that could be combined with the mobile technology component in order to enhance teachers' professional development (Fakazli and Gonen, 2017; Mathew, Mathew and Peechattu, 2017). In fact, there is a gap between what teachers have learned theoretically and what is taking place in a real practice context (Fakazli and Gonen, 2017). Teachers' reflective practice may help in closing this gap. It is a crucial element in any learning process and in any programmes of improving teachers' skills (Akbari and Allvar, 2010; Boud, Keogh and Walker, 1985; Sturkie, 2017).

Studies indicate that through reflective practice, teachers could earn *"a deeper understanding of their own teaching style and ultimately, greater effectiveness as a teacher"* (Ferraro, 2000, p.4). They can also enhance teachers' abilities to understand themselves (Akbari, 2007). Furthermore, educational policymakers in Oman set the involvement of teachers in reflective practice as a strategy to attain the necessary teachers' professional development, in order to address the reform requirements that commenced in 1998 (Ministry of Education, 2004). However, reflection occurs in an environment of dialogue and interaction with others (Rodgers, 2002) which is very rare in the context of school, since teachers tend to move around different areas within the school, such as classrooms, playgrounds, and staff rooms, without the intention of spending time in discussions with their colleagues about any specific topic (Aubusson et al., 2009).

Fortunately, mobile technology could provide such interactions in an environment that may contribute to an improvement in teachers' reflective practices. Many studies indicate that both mobile technology and reflective practices have the potential to work together

(Bodzin and Park, 2002; Farr and Riordan, 2015; Harrington and Hathaway, 1994; Kirk, 2000). The virtual online discussion environments, such as blogs, forums, chats, and electronic portfolios, could be used as platforms to promote reflective practice (Bodzin and Park, 2002; Farr and Riordan, 2015; Harrington and Hathaway, 1994; Kirk, 2000).

Motivation is another component that could be developed through cooperation and dialogues (Tauer and Harackiewicz, 2004). It is a significant factor that notably may underpin success in every field (Tombak and Altun, 2016). Motivation is viewed as an element that strongly affects learning and teaching processes, because it plays an essential role in stimulating and orienting teachers' and learners' actions towards achieving their goals (Chalermnirundorn, 2018). Unfortunately, very few studies focus on Omani science teachers' motivation, despite widespread agreement on the importance of motivation in developing teaching and learning processes (Al Rasbi, 2013). In contrast, both mobile technologies and motivation have the potential to work together (Price and Kadi-Hanifi, 2011). There are many studies that support this claim, such as Price and Kadi-Hanifi (2011), and Chaiprasurt and Esichaikul (2013).

However, the effect of using mobile technology is still not entirely obvious in the field of motivation (Kilis, 2013). Thereby, one of the essential goals of this study is to evaluate the utilisation of mobile applications, especially, two of their hosted apps (Facebook and Twitter) as motivational tools. In this study, these mobile applications are used as an indirect means of enhancing motivation through cooperative working, whereby Omani in-service science teachers interact with their colleagues, who teach the same age group of pupils. In conclusion, this study integrates the use of mobile applications with teachers' reflective practices and their motivation as part of their professional development.

1.7 Aims of the Study

This study aims to:

1- Explore the extent to which Omani science teachers practise reflection.

2- Explore the extent to which Omani science teachers are motivated towards teaching and planning lessons.

3- Investigate the possibility of employing mobile applications (specifically Facebook and Twitter) as motivational and reflective tools.

4- Examine the impact of using mobile applications (Facebook and Twitter) on Omani science teachers' reflective practices and their motivation.

5- Determine the influences that affect Omani science teachers' reflective practices and their motivation towards teaching and planning lessons.

6- Inform policymakers and educators in Oman, who are responsible for professional development programmes of Omani in-service teachers, about the potential of mobile applications regarding teachers' professional development.

7- Reduce the gap in the studies that examine the impact of using mobile technology on teachers' professional development (Ekanayake and Wishart, 2015).

1.8 Study Questions

This study answers the following questions:

1. To what extent do science teachers in The North AL Batinah Region of the Sultanate of Oman:
   A. Practise reflective teaching?
   B. Show motivation towards teaching and planning lessons?

2. What are the key influences associated with science teachers' levels of reflective practice and their motivation towards working as teachers?

3. Is there any significant association between science teachers' reflective practices and their motivation towards:
   A. Teaching?
   B. Planning lessons?

4. What is the impact of using mobile technology as a training platform on science teachers':
   A. Reflective practices?
   B. Motivation towards: a. teaching?   b. planning lessons?

Chapter Two: Literature Review

Introduction

The current chapter is divided into two main sections. The first one shows the theoretical frameworks of the study, which basically involves the three main variables of the study - mobile technology, teachers' reflective practices, and teachers' motivation. The second section presents the empirical studies regarding the same main variables (mobile technology, teachers' reflective practices, and teachers' motivation).

In terms of mobile technology, the first section starts with the historical introduction and definitions of mobile learning. It then shows the following aspects: mobile device benefits, mobile learning barriers, mobile technology and its relation to teachers' professional development. Finally, it discusses the roles of Social Network Sites (SNS), such as Facebook and Twitter, in fostering learning and teaching processes.

In terms of reflective practices, the theoretical frameworks section begins with defining reflection. Next, an historical introduction is presented. After that, the section discusses teachers' reflective practices and its association with their professional development. Then, the levels of reflection and how to measure teachers' reflective practices are shown. Finally, this part presents models of reflection and how to promote reflective practices.

Motivation is the last variable that is discussed in this section. It starts with defining motivation and shows its importance. Teachers' motivational influences are then identified. Finally, theoretical approaches to interpreting and enhancing teachers' motivation (specifically the Achievement Goal Theory, Self- Determination Theory, and Expectancy-Value Theory) are shown.

The second section of the current chapter focuses on empirical studies that are related to mobile technology, employing virtual environments (online sites, blogs, chat rooms, e-portfolio, e-journals, and forums), Facebook and Twitter as educational tools, teachers' reflective practices, teachers' motivation, and influences that affect their motivation. Finally, this section shows the estimation of the likely study effect size.

Section One: Theoretical Frameworks

2.1 Mobile Technology

Introduction

The 21st Century was distinguished by rapid changes in society and technology (Peters, 2007). Consequently, educational institutions have to keep up with those changes in order to enhance the necessary attractive factors that are essential for making the learning process useful and enjoyable. This part of the chapter covers the following: historical introduction, definition of mobile learning, mobile learning benefits, mobile learning barriers, mobile technology and its relation to teachers' professional development, social network sites (SNS), with Facebook and Twitter as platforms.

2.1.1 Historical introduction

Landline telephones, which were invented in the 19th Century, gained steady popularity and reached their peak during the beginning of the 21st Century when the majority of the worlds' population had the ability to secure easy access for their use (Ling and Donner, 2009). However, certainly, the 21st Century period will always be remembered as a mobile stage, since the level of adoption of mobile use has spread, overcoming both landline telephone and internet use (Ling and Donner, 2009). According to Statista (2018a), and GSMA Intelligence (2018), there are approximately five billion mobile phone users amongst the world's population of 7.6 billion inhabitants.

Although this technology could be considered as a luxury among many, it plays a significant role in our daily lives (Althunibat, 2015). It continues to play new roles in different sectors and fields, especially in the educational field, after it took the shape of a computing platform. Using mobile devices as a platform for teaching and learning processes could be considered as a result of the combination between communications and wireless technologies with pedagogy (Wains and Mahmood, 2008).

The interference of tele-communication technology in the educational field began in the 1980s, with a notion known as E- learning (Hashemi, Azizinezhad, Najafi and Nesari, 2011), which is mainly based on utilizing the internet. Meanwhile, a tremendous parallel development was taking place in the area of mobile technology. Bennett (2010) mentioned that, *"While the internet was permeating modern life, a parallel development was taking place that would have even greater significance for billions of people around the world: the*

development of the cell phone. Inevitably, these two transformative technologies began to merge, enabling the rise of the mobile internet" (p.1). Integrating this technology in the educational system has taken place over the last two decades (Sung, Chang and Liu, 2016).

Mobile devices have become more affordable and reachable, and as a result of that a new approach of learning has been revealed known as M-learning (Hashemi et al., 2011; Ozdamli and Cavus, 2011). The educational field first relied on internet and computers as educational tools, but then it seems that it became more attractive to utilise mobile technology, because it has many more features that allow better educational tools (Sarrab, Elgamel and Aldabbas, 2012). Mobile phones, laptops, and tablets are examples of mobile devices which entail significant potential for learning and instruction (Sung et al., 2016). Their exceptional communicating capacity and portability encouraged individuals to utilise them in both their outdoor and indoor learning (Sung et al., 2016). In fact, mobile technology created new means for students' and educators' communication (Chaiprasurt and Esichaikul, 2013). It helped them to access course information and activities, and enhanced students' motivation (Chaiprasurt and Esichaikul, 2013).

The United Nations Educational Scientific and Cultural Organization (2017) justify the utilisation of mobile technologies in the field of teachers' professional development, according to:

1. Estimations indicate that many teachers in developing countries already have this technology and their spread helps to support their professional development.
2. The mobile device touch screen is an easy interface, and understandable to these teachers, even to those who are not familiar with technology.
3. Mobile networks cover large areas of the world.
4. Mobile devices are highly flexible communication devices that allow teachers to communicate with their colleagues, gain their feedback, and allow them to participate in private internet educational communities.
5. Mobile devices can support learning in different places and at different times.

2.1.2 Mobile learning definition

The mobile is *"that which moves; mobility is the capacity to move"* (Wilken and Goggin, 2013, p.26). So this term means, *"possibility of taking place in multiple locations, across multiple times, and addressing multiple content areas using either static or portable equipment, such as wireless laptops, personal digital assistants (PDAs) and smart phones"*

(Sarrab et al., 2012, p.31). Ally (2009) believes that M-learning refers to, *"learning delivered or supported solely or mainly by handheld and mobile technologies such as personal digital assistants (PDAs), smart phones or wireless laptop PCs"* (p.13). While Lan and Sie (2010) suggest that it is a paradigm of learning where learners can access educational materials anywhere and anytime by utilising different types of mobile devices. Sarrab et al. (2012) define it as,*"the use of mobile and handheld IT devices, such as mobile telephones, laptops, PDAs and tablet PC technologies, in training, learning and teaching"* (p.31). However, Terras and Ramsay (2012) argue that many theories recognise that learning has an undeniable and clear social aspect. Sharples, Taylor, and Vavoula (2007) claim that, *"conversation is the driving process of learning"* (p.5). They view and interpret mobile learning through conversation and context, not through the technology or the learner. In fact, the interaction between both the technology and the learner could form a fundamental element to understand mobile learning (Sharples et al., 2007). According to Sharples et al. (2007), this learning is, *"the processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies"* (p.4). The importance of this social aspect has been recognised by this study, and the researcher adopts this definition as it could potentially be the closest definition regarding the study's goals and structure.

2.1.3 Mobile device benefits

UNESCO has continued to advocate for the challenges faced by many poor countries, especially in terms of providing teachers and teacher quality through employing highly available technology - mobile devices (the United Nations Educational, Scientific and Cultural Organization, 2017). In this study, smartphone applications (Facebook and Twitter) were integrated with activities prepared according to two reflective practice models, and one motivational theory, in order to positively affect the teachers' professional development programme. The argument of the study is based on the potential of mobile technology to serve teachers' professional development programmes, due to its high level of positive characteristics and features. Thus, it is crucial to build an expanded discussion about these characteristics and features. The main question here is - is this technology capable of contributing to the development of teachers' professions, especially regarding their reflective practices and motivation?

Researchers have considered mobile technology from the beginning of its existence as a means to deal with many educational dilemmas and obstacles, such as the learning of a mobility learner, learning in informal settings, and the difficulties of applying many learning

theories (Sharples, 2006). Furthermore, many studies refer to the feasibility of utilising this technology to improve learning and teaching processes. These studies support the claim that there are many features in this technology through which it could underpin these processes. For instance, Klopfer, Squire and Jenkins (2002) mention some of the various features of mobile devices, such as:

1. Portability: Where it is possible for the learner to hold the device and move around their location.

2. Social interactivity: Where it is possible for the learner to have dialogues and discussions with other colleagues in order to exchange information.

3. Context sensitivity: Where data are collected with consideration of learners' location, time, and environment.

4. Individuality: Where it is possible for the learner to have their own unique way of conducting investigations.

Some of these previous features, as well as various others, were mentioned in Ozdamli and Cavus's (2011) study, who argue that mobile technology is characterised by different features, such as *"ubiquitous, portable size of mobile tools, blended, private, interactive, collaborative, and instant information"* (p.940). Song (2011) points out that *"portability, connectivity, convenience, expediency, immediacy, accessibility, individuality and interactivity"* (p.120) are exclusive characteristics of mobile devices. In general, using this technology for learning and teaching processes has many advantages, such as: flexibility in time and location, low cost, easy access to knowledge, an increase in group cooperation between learners, facilitates lifelong learning, increase of computer accessibility, underpinning diversity in teaching styles, and enhancing academic performance (Akhshabi, Khalatbari and Akhshabi, 2011; Sung et al., 2016; Valk, Rashid, and Elder, 2010). This sort of technology has the potential to allow learners, who are not able to physically attend courses of a conventional educational system due to a myriad of different reasons, to participate in these courses (Kukulska-Hulme, Evans, and Traxler, 2005; Valk et al., 2010). Its portability feature provides those learners with the opportunity to have more access to educational materials and courses, overcoming any obstacles related to time or location (Valk et al., 2010).

Imtinan, Chang and Issa (2013), and Ally (2009) summarise the common characteristics of mobile learning. These characteristics include usability (the simplicity of using mobile devices in learning processes), collaboration, presenting various contexts of learning, controlling the roles of participants in the learning process, connectivity (cellular and wireless access technology), mobility (time and space flexibility), blending learning (the integration of different learning strategies with physical and virtual learning materials), the ability to modify learning content, necessity of technical support, and learning that is impacted by cost.

These characteristics and features encouraged scholars and policymakers to employ mobile technology in teaching, training and learning processes. Different empirical studies contend that mobile technology could be reliable in providing private learning and in delivering training without facing the constraints of time and physical locations (Ysri, Goodwin, and Mooney, 2015). Kukulska-Hulme and Traxler (2005) believe that mobile technology has delivered the hope of providing *"independent investigations, practical fieldwork, professional updating, and on-the-spot access to the knowledge"* (p.26). Some scholars also believe that mobile technology does not only facilitate or support learners' access to educational materials, but also supports designs for many other types of learning, in particular, instant learning, informal learning, personalised learning, authentic learning, and cooperative learning (Kukulska-Hulme, 2009; Sung et al., 2016; Valk et al., 2010). For instance, Peters (2007) outlines the main benefits of mobile learning that encompass the availability of instant, sufficient, and private learning which could take place in the workplace (schools). This learning occurs in the context of collaboration and interaction with colleagues and peers. Furthermore, this learning can be tailored to the needs of each student, and at different work sites (Peters, 2007). In addition, Dirin (2016) considers mobile learning as a path for an alternative medium of learning that is not affected by the conventional constraints of time and location. In terms of teaching, this technology facilitates reaching media-rich content, and therefore underpins the type of teaching that emphasises content and the teachers' role (Kukulska-Hulme and Traxler, 2005).

On the other hand, with regard to remote areas, Valk et al. (2010) argue that there are serious challenges that hinder improvement in the educational sector in developing countries, especially in rural and remote areas where some primary school age children are not yet enrolled, or they do not receive quality learning. Furthermore, it seems that the ability to improve the educational system by providing quality low-cost learning, continues to form a

challenge for policymakers and scholars in those areas (Valk et al., 2010). All these factors combined, in addition to the fast ubiquity of mobile devices in developing countries, causes attention to be drawn to the role of mobile technology (Valk et al., 2010). It is an advanced form of information communication technology (ICT) that may foster and enhance teaching and learning, due to its ability to facilitate dialogue and interaction (Valk et al., 2010).

Lan and Sie (2010) summarise researchers' views about the beneficial utilisation of mobile devices for purposes of learning. These benefits are:

1. Enhancing learners' communications and dialogues.

2. Supporting the learning of those who are geographically distant.

3. Fostering active learning.

4. Providing learners with spontaneous feedback.

5. Considering the time taken to perform tasks.

6. Learners can obtain learning materials quickly.

In conclusion, these benefits and features of mobile technology can support the enhancement of teachers' professional development programmes. Thereby, educational institutions have to review their stance regarding employing such technology in their efforts to provide quality teachers.

2.1.4 Mobile learning barriers

Mobile devices are undoubtedly excellent learning platforms because they are available to most students, and can provide them with the support they need during and after the learning process (Sarrab et al., 2012). Their wide presence and their integration into academic settings have made learning processes more enjoyable, flexible, and less expensive, freeing up students from many constraints (Sarrab et al., 2012).

Despite the distinctive features of mobile devices, they are not adequate for providing an environment for a concrete and perfect learning platform (Sung et al., 2016). Mobile learning, as with any type of learning, may face many barriers and obstacles (Kukulska-Hulme and Traxler, 2005). It seems that the journey to employ mobile learning confidently in the processes of teaching and learning still needs much time and effort. The utilisation of mobile devices does not appear to be acceptable in the majority of schools around the world or in

many universities (Sarrab et al., 2012), and in fact, many universities prohibit their use. Students sometimes, but rarely, use these mobile devices to search for information during lectures through a web browser. However, some students who are in classes that teach a foreign language, may utilise these devices for translation (Sarrab et al., 2012). Students occasionally employ mobile phones to photograph what the lecturer has written on the whiteboard, or to record PowerPoint presentations (Sarrab et al., 2012).

Preventing learners from utilising mobile technology could be a mistaken decision (Kustijono and Zuhri, 2018), but it is not yet straightforward for teachers to allow students to bring their personal, handheld tools such as mobile phones and iPads into the classroom (Wishart, 2015). One reason for this is that teachers in general are not trained in how to teach with these devices, nor how they can be used for their learning (Terras and Ramsay, 2012; Wishart, 2015). Thus, it seems that it is vital to educate teachers, whether during their preparation stage or later, about the capability of this technology in order to underpin their teaching and the learning of their pupils. Besides, mobile technology has a fast pace of advancement that is difficult for educators and policymakers to keep up with (Terras and Ramsay, 2012).

Peters (2007) identifies some key factors that are responsible for the limitations of using mobile devices for educational purposes, despite the fact that they receive considerable recognition from trainers and educators.

1. The age of teachers and trainers, and their capability to employ mobile technology.

2. The cost of these devices.

3. Some educational institutions, especially the larger ones, need long periods of time to make a change in their strategies and approaches.

4. The design of mobile devices is not completely suitable to serve educational purposes.

2.1.5 Mobile technology and its relation to teachers' professional development

Teachers, as a vital component in the educational system, have to be prepared for digital world technology since educational systems all over the world are heading towards increasingly employing this technology in teaching and learning processes (Kajornboon, 2013). Technology has become a crucial element for these processes through its diverse formats, different resources, multiple delivery channels, and its ability to overcome

constraints of time and place (Ali, Yaacob, Endut, and Langove, 2016). The internet is considered as a rapid medium and an instant channel for bringing individuals together for the purpose of improving their knowledge and experiences (Ali et al., 2016), while, internet-related technology, such as mobile technology, has proved its ability to deal with issues linked with achievement and performance at all levels and in many fields, especially, in the educational field. This technology has become an ideal platform for those who are looking for quality of performance as it gives them a wider horizon to reach solutions in an irrefutable manner.

The mobile sector leads the development of the internet and communications technology field worldwide. Nowadays, mobile devices have become a fundamental element of our everyday lives, and have formed new social patterns (Ally, 2009). Their emergence has contributed to the provision of opportunities for learning through handheld devices, such as the smart phone, tablets, and netbooks (Peters, 2007; Terras and Ramsay, 2012). In fact, accessing the Web these days relies more and more on these handheld devices, especially, smart phones (Terras and Ramsay, 2012). They are mostly available for the majority people around the world (Ally, 2009; Aubusson et al., 2009). The growth in use of smart phones spread so rapidly that at the end of 2017, 65 per cent of the world's population had mobile subscriptions (GSMA Intelligence, 2018).

Recently, the utilisation of these devices for educational purposes has been broadly accepted (Kilis, 2013). This is because of *"their portability, convenience, independence of time, location, flexibility, and so on"* (Kilis, 2013, p.375). Furthermore, this spread, their availability, and their easy access to the internet gave them the potential to underpin teachers' professional development (Ally, 2009; Aubusson et al., 2009). This technology facilitates teachers' access to the latest educational information. It provides them with the required atmosphere of interaction, collaboration, and reflection which are considered as key factors for teachers' professional development (Aubusson et al., 2009). Through this they can become increasingly more aware of their colleagues' perspectives on certain topics (Aubusson et al., 2009) and receive instant feedback. These beneficial roles of this technology, coupled with its fast moving development, encourage educational organizations to employ it (Bidin and Abu Ziden, 2013). This is in order to regularly develop their systems of learning and teaching, and in order to be continuously attractive to learners (Bidin and Abu Ziden, 2013).

Thus, it is necessary for policymakers and trainers who prepare and manage in-service teacher training programmes to explore the potential of this technology in order to serve their efforts to develop in-service teachers' professions.

In fact, despite the enormous potential of this technology, little evidence has shown that teachers' professional development is desirable or effective through it (the United Nations Educational, Scientific and Cultural Organization, 2017). Employing mobile technology in teachers' professional development programmes is very rare. This may be due to the various limitations that are linked to mobile devices, such as screen size, or due to in-service teacher issues, such as motivation to become involved in such programmes (Kilis, 2013). However, it is vital to educate them about such technology in order to be aware of the ways of utilising and dealing with it, since it has proven its considerable positive effects on the learning and teaching processes. Mobile phones could provide an efficient environment to facilitate the professional development of teachers and their training. The most efficient approach to do so is through monitoring and guidance, where a master teacher or an inspector could direct teachers with limited teaching experience, and provide them with appropriate support, by using mobile applications that facilitate monitoring (the United Nations Educational, Scientific and Cultural Organization, 2012). These applications provide immediate feedback and reduce time taken for observations and meetings, cost, and the need for the presence of inspectors (the United Nations Educational, Scientific and Cultural Organization, 2012). Furthermore, some of these applications are commonly used for creating online communities that aim to enhance teachers' professional development through providing collaborating with peers, opportunities for raising questions, opportunities for discussing ideas, immediate and easy presentations, lesson plans, and the possibility of sharing videos (the United Nations Educational, Scientific and Cultural Organization, 2012).

2.1.6 Social network sites (SNS)

Social network sites have entirely changed the means of reaching knowledge and information (Ali et al., 2016). They involve interaction with strangers as well as social network visibility (Boyd and Ellison, 2008). Nowadays, social networking sites, in particular, Facebook, are used by some teachers and students to deliver educational materials (Calvo, Arbiol and Iglesias, 2014). Sirivedin et al. (2016) claim that online social network sites could be suitable environments for providing convenient and useful external learning conditions. However, Hamat, Embi and Hassan's (2012) study shows that social network sites may not positively foster students' learning performance, as they might spend more time socialising

instead of learning. These networks rely on various popular communication avenues that are helpful in applying various kinds of learning, such as collaborative learning (Ali et al., 2016). Social network sites are, *"web-based services that allow individuals to construct a public or semi-public profile within a bounded system, articulate a list of other users with whom they share a connection, and view and traverse their list of connections and those made by others within the system"* (Boyd and Ellison, 2008, p.211). Joining a social network site requires creating a profile by answering a few questions related to the individual, such as age, location, and interests (Boyd and Ellison, 2008).

Social network sites differ in their way of displaying a profile, and in the way of making profiles visible to others. Some sites allow anyone users' profiles to be public, while others enable individuals to manage their visibility, to be public or not (Boyd and Ellison, 2008). This study mainly relies on the use of two types of social networking sites (Facebook and Twitter), through mobile devices only (smart phones).

Facebook Platform

Facebook, as an application on smart phones, has been available to the public for a relatively long time. This famous platform of social media has increasingly become a venue for educational purposes (Serrano and Yambao, 2015). The 'We Are Social' digital report (2018), claims that *"More than 3 billion people around the world now use social media each month, with almost all of those users accessing their chosen platforms via mobile devices"* (p.3). Furthermore, according to Statista (2018b), there were 2.19 billion monthly active users of Facebook worldwide in the first quarter of 2018, which shows a huge spread of this social media platform. Facebook, as a smart phone application, could be used in order to provide communication among learners, creating a social environment, allowing discussion, and fostering sharing between learners (Kustijono and Zuhri, 2018). Data delivered or received by the Facebook app is essentially different, as it can be a form of textual data, a form of audio or video data, or all of them (Murphy et al., 2014).

Despite the fact that social network applications like Facebook allow individuals to interact with others, rather than merely receiving educational materials or instructions, it is still not totally acceptable within educational society (Serrano and Yambao, 2015). Serrano and Yambao (2015) revealed that Facebook could represent a platform for academic collaboration where learners exchange their ideas, share their resources and materials, form a

network, and socially become involved with their colleagues. However, they outline six challenges and constraints faced when using Facebook as a learning venue. These are:

1. Communication: where it is not easy to break the barriers that prevent learners from having regular communication.

2. Coordination: where it is usually not easy to adjust and manage learners' schedules to obtain a synchronous coordination.

3. Connectivity: where there are some areas with weak internet coverage.

4. Commitment: where some learners do not participate in the discussion or participate late.

5. Harmonisation: where it is difficult for learners with various experiences and knowledge to reach an agreement about the appropriate postings or responses.

6. Integration: where it is not easy to reach the final conclusion from the ideas of different groups.

Twitter Platform

Twitter is a type of social network site that provides a micro-blogging service, whereby it enables the posting of short messages, known as a 'Tweet' (Bista, 2015; Mork, 2009; Wright, 2010). It also allows its users to upload photos or short videos via any device with internet access. Since November 2009, the main aim of the Tweet was to answer the question 'What's happening?' However, before this, a 'tweet' was originally posted in order to answer the question, 'What are you doing?' (Bista, 2015; Mork, 2009; Wright, 2010). When it was established in October 2006, Twitter did not allow tweets to be posted in excess of 140 characters (Bista, 2015), but then in 2017, it doubled this character limit for tweets to 280 characters.

The number of Twitter users has expanded over the years. In the first quarter of 2018, there were on average 336 million monthly active users of Twitter (Statista, 2018c). Individuals utilise Twitter for many purposes such as asking questions, exchanging information and ideas with others, getting support and consultations, and validating their new ideas (Grosseck and Holotescu, 2008).

This social networking site (SNS) has key attractive factors, such as creating an atmosphere for forging friendships and for interacting with others concisely, since users are

not able to exceed 280 characters, which may form between one and three sentences (Mork, 2009; Statista, 2018c). Twitter also gives its users the capability to track other users through the 'Follow' feature, which allows them to be updated easily with new tweets related to the individuals they follow (Mork, 2009).

Grosseck and Holotescu (2008) point out that Twitter can affect the learning process positively, for the following points:

1. Teachers can share their successful experiences with others.

2. It has the capability to improve classroom dynamics.

3. Twitter is feasible to gain useful information.

4. It could serve the professional development of teachers through creating a virtual educational society.

5. It helps teachers to be available for their students.

6. It could be helpful for analysis purposes.

7. Twitter can be exploited by learners for enhancing their reflection.

8. It could link between learners who do not know each other.

9. It has the ability to show the entire discussion of learners about a certain topic.

10. It helps to provide on-the-spot announcements.

In contrast, according to Grosseck and Holotescu (2008), utilising Twitter may affect the learning process negatively due to it perhaps being a confusing and distracting tool for learners, possibly consuming a lot of their time. Also, it did not demonstrate any feasibility in enhancing learners' grades, and is limited in regard to response rate. It could lead to addiction, and also teachers may feel that they are on-call 24/7. Also, the limitation of the allowed number of characters per Tweet may result in unclear responses with the chance of grammar errors (Grosseck and Holotescu, 2008).

2.2 Reflective Practices

Introduction

Deep discussions about reflection require much space that may not be available in this study, which involves many terms and concepts. The majority of the key elements of

reflection that support the idea of this study, as I believe are: understanding the meaning of reflection/reflective practice, showing the historical development of the concept, discussing the relationship between reflective practices and teachers' professional development, addressing the levels of reflection and its measuring instruments, presenting models of reflection, and identifying ways to promote teachers' reflective practices. The following section covers all of these aspects.

2.2.1 Reflection definition

The mainstream opinions in the literature about reflection terms are that it is a controversial and confusing concept that lacks a universal and agreed definition (Akbari, 2007; Rogers, 2001; Ross, 2011). However, there are considerable attempts to grasp this term. For example, Rogers (2001) attempted to determine a common understanding for the term 'reflection' throughout the review of several approaches that encompass the studies of Dewey, Schon, Loughran and Mezirow. He found that all of the studies commonly agree that "*reflection is a cognitive process that requires the individual's active engagement, is triggered by an unusual or perplexing situation or experience, involves examining one's responses, beliefs, and premises in light of the situation at hand, and results in the integration of the new understanding into one's experience*" (Rogers, 2001, p.41). Indeed, reflection is an intellectual rerunning of our experiences and decisions with the purpose of analysing them throughout the processes that led to produce them (Killion, Joellen, Todnem, and Guy, 1991). It is a constant and deliberating act towards identifying and exploring rational and beneficial knowledge from our experience in order to employ it for future actions and behaviours (Killion et al., 1991). Boyd and Fales (1983) argue that this term represents "*the process of internally examining and exploring an issue of concern, triggered by an experience, which reacts and clarifies meaning in terms of 'self' and which results in a changed conceptual perspective*" (p.100). It is "*a process of reviewing an experience of practice in order to describe, analyse, evaluate and so inform learning about practice*" (Reid, 1993, p.305). These definitions basically focus on reviewing an experience through implementing certain processes. The purpose of these processes is to acquire a confirmed individual reaction to a similar situation in the future.

Moon (2013), on other hand, argues that the term 'reflection' may involve many considerations when it is being used. For example, it can be assumed as a concept that falls into the process of learning. When a person reflects on something they actually wants to

address it in some detail. She also addresses reflection as a process that has a meaningful goal, or a process that leads to useful results (Moon, 2013). She points out that this term can be understood from the angle of mental processes, so that it can be considered as a mental process related to recalling previous experiences that have no clear solution. All these meanings of reflection suggest that it is a term that includes a form of mental processes that has goals and purposes of dealing with unclear and complex situations and ideas which may foster the learning process (Moon, 2013).

In our lives we may face many ambiguous and difficult experiences that could lead us to think deeply about how to deal with them, especially if they can affect our future (Pacheco, 2005). Reflection begins when an issue or a problem occurs (Akhbari, Behzadpoor, and Dadvand, 2010). It may confirm or change our ideas and our future decisions through its process that includes thinking deeply about previous experiences or ongoing actions in order to understand them (Reynolds, 2011). Dealing with and addressing these experiences helps us to grow and makes us ready to better deal with the challenges of our future lives (Pacheco, 2005).

There is uncertainty among some researchers about this concept in terms of whether it is just thinking about a specific action or it is the action itself (Hatton and Smith, 1995). Boud et al. (1985) contend that reflection is action-oriented, that serves political and social human interests. Zeichner and Liston (1996) argue that examining the assumptions is a crucial element for being engaged in reflection. It is understandable to claim that reflection is a private, personal and internal process since it takes place inside the brain. But if we accept this opinion, then we in this case, are neglecting a key feature of reflection which is about relating thought to action (Boud et al., 1985). Thus, reflection focuses on the interaction between internal (thought) and external processes (actions) in order to be ready for new experiences in the future (Boud et al., 1985).

Reflective practice process, where individuals' reliance on learning by recalling their past experiences rather than relying on formal theoretical learning and where the combination between theory and practice is provided, is an important tool to test the values system of teachers and to support their professional development (Mathew et al., 2017). It is *a process where teachers think over their teaching practices, analyse how something was taught and how the practice might be improved or changed for better learning outcomes"* (Mathew et al., 2017, p.127). It is *"a kind of self-examination to judge whether things have been done in*

an appropriate and realistic way and to go further and make meaning of one's actions by questioning motives and attitudes; in other words, reflection means engaging in deliberation and self-criticism with the purpose of refining one's teaching practices" (Akbari and Allvar, 2010, p.3). Akbari et al. (2010) address the meaning of a reflective teacher and they assert that the reflective teacher is the teacher who criticises their own actions, suggests plans to enhance their efforts in improving pupils' learning, and examines the effects of these plans in reality. In fact, *"reflection is thinking about thinking in which we consider the relationship between our thoughts and action in a particular context"* (Boud et al., 1985, p.141).

2.2.2 Historical Introduction

John Dewey

When the researcher started his process to understand the term 'reflection' throughout the literature and studies, he found that they all lead him toward John Dewey's book 'How We Think'. It seems that this educational philosopher is the establisher of the term 'reflection' in this modern era, or in other words, he is the one who formally formed reflection's conceptual framework (Akbari, 2007; Farr and Riordan, 2014). He attempted to compare the differences between routine actions, which are actions that are motivated by tradition and authority, and reflective actions arguing that reflection distracts individuals from routine actions (Finlay, 2008; Goodman, 1984; Tsangaridou and Siedentop, 1995). He claimed that perplexity, hesitation, confusion, or doubts are the drives of the reflective process and one of its main elements (Dewey, 1910 and Finlay, 2008). He also suggested that investigation in order to find the truth behind beliefs is another main element of the reflective thinking operation (Dewey, 1910). Dewey views reflective process as an *"active, persistent, and careful consideration of any belief or supposed form of knowledge in light of the grounds that support it and the further conclusions to which it tends"* (Dewey, 1910, p.6).

However, Rodgers (2002) argues that in spite of Dewey's continuous interest in reflection in many books and essays, he did not clarify clearly what he meant. According to Rodgers (2002), there are four elements that hinder reaching a clear understanding of this concept. First, what is the difference between reflection and other types of thinking? There is also a lack of identification of evidence under which reflection can be realised; this is the second element. The third element is the lack of a common language in educational literature while talking about reflection. Finally, it is not an easy task to understand the impact of reflection on professional development and learning since we don't agree on its meaning

(Rodgers, 2002). Rodgers (2002) outlines four standards to look to reflection according to Dewey's perspective:

1. Reflection ensures continuous learning, and is a way of forming a meaning which helps an individual to face the next experience through considering deeply the relationships and links of this experience with other experiences and beliefs.

2. *"Reflection is a systematic, rigorous, disciplined way of thinking, with its roots in scientific inquiry"* (Rodgers, 2002, p.845).

3. Reflection occurs in an environment of dialogue.

4. Reflection needs stances that respect the private and mental advancement of both the individual and of others.

Yet, Dewey efforts, along with two other scholars' efforts (Van Manen and Schon), are considered to be the root for many reflection definitions addressed later in the literature (Tsangaridou and Siedentop, 1995).

Van Manen

Van Manen (1977) added his contribution to the reflection development field through determining reflection levels. He mentioned that the first level of reflection is concerned with achieving important goals relying on using educational knowledge as a technique 'Technical Reflection' (Goodman, 1984; Van Manen, 1977). Reflection, at this level, is linked to the effectiveness of this technique rather than to what extent these goals are valuable (Goodman, 1984; Van Manen, 1977). The second level of reflection is 'Practical Reflection' which is concerned with exploring and explicating the links between educational concepts and practice, that is, people's cultural experience implications, considerations, and assumptions in order to improve their practical actions (Goodman, 1984; Tsangaridou and Siedentop, 1995; Van Manen, 1977). It is also concerned with evaluating the educational results of both practices and beliefs (Goodman, 1984). The highest level of reflection according to Van Manen is 'Critical Reflection' which refers to reflecting critically on the values of knowledge and on some social aspects, such as ethics and politics, that vitally affect educational aims and practices (Goodman, 1984; Tsangaridou and Siedentop, 1995; Van Manen, 1977).

Schon

Finally, it would be unacceptable to ignore Schon's role when talking about teachers as reflective practitioners (Saric and Steh, 2017). In this concept, he underlines reflection not only as a crucial component of the process of reviewing past experiences but as a continuous path through which understanding and experience are associated (Reynolds, 2011). In fact, he made significant effort in forming a framework for improving reflective practitioners instead of illustrating the reflection process (Finlay, 2008). He considered reflection as a significant factor to develop profession (Cheetham, and Chivers, 1998; Saric and Steh, 2017).

On the other hand, many scholars present the contributions of Schon in the field of reflection through discussing his approach of distinguishing reflection types as a reflection-in-action or a reflection-on-action (Alrumaih, 2016; Christodoulou, 2013; Tsangaridou and Siedentop, 1995). Basically, during reflection-on-action, professionals are consciously aware of their previous experience and they attempt to review, describe, analyse, and assess it with a purpose to obtain a vision for enhancing their future actions and for teaching more effectively (Finlay, 2008; Lupinski, Jenkins, Beard and Jones, 2012). Universities and colleges are familiar with this type of reflection which is usually employed in groups and in collective form (Akbari, 2007). In terms of reflection-in-action, it is considered as studying teachers' experiences and their reaction to that experience when it happens, or in other words, acting immediately during teaching in order to enhance it (Finlay, 2008; Lupinski et al., 2012).

2.2.3 Reflective practice and its relation to the professional development

Teaching is the most vital component in any educational system through which knowledge, skills, and values are transmitted to learners. Teachers' ways of teaching, planning, and their classroom behaviours are basically shaped and interpreted by their beliefs, principles, assumptions, and theories of teaching (Richards, 1998). Indeed, teaching is based on a vast number of principles, ethical values, theories, and hypotheses which are part of the framework of teachers' knowledge and are sources of variations in their classroom practices (Richards, 1998; Scarino and Liddicoat 2009). Their differences in these sources lead to the observed differences in their classroom practices. If a teacher's perception about teaching is as an approach for transmitting knowledge (didactic view) then their classroom practices will certainly differ from a teacher who believes that teaching is a form of creating knowledge through investigation and exploration (discovery view), or a form of students interactions with experimental observations and curriculum content (interactionist view) (Richards,

1998). Furthermore, many teachers, when they first start working as a teacher, realise that there is a gap between what they have learned theoretically and what is taking place in a real practice context, and therefore some may feel perplexity when faced with some problematic classroom situations (Fakazli and Gonen, 2017).

Han (1995) addresses that there are no fixed answers to solve obstacles in the educational area and it is not possible to prepare teachers for all situations. It is the duty of teachers to decide the right path to deal with these obstacles. Adding to all those issues, we need to highlight the effect of the globalization factor which allows the reaching of information and expands global relationships and communications (Scarino and Liddicoat, 2009). This factor has created a fast transmission of knowledge and ideas between people all over the world which lead to drawing attention to the need for reviewing the previous understanding of society's culture and values (Scarino and Liddicoat, 2009). The educational system was not immune to the impact of globalization. Furthermore, there are many manifestations of diversity in teachers, students, and communities who partly formed this system. This diversity brought a diversity of experiences, backgrounds, and knowledge which influenced the teaching and learning process (Scarino and Liddicoat, 2009). This means that teaching is complicated and has many dimensions (Hall and Smith, 2006). Therefore, the need for a continuous process for examining teachers' beliefs, knowledge and values is vital.

Reflective practice provides teachers with a rational context for examining their hypotheses, principles, and ethical and theoretical frameworks that underlie their classroom practices (Richards, 1998). Sturkie (2017), and Akbari and Allvar (2010) point out that the enhancement of teachers' skills and also learners' achievements, could be through the tool of reflective practice. It allows them to understand the connection between their practice and the way to improve it (Ghaye, 2011). It enables teachers to deal with difficulties and issues related to learning, expanding their awareness, and producing new ideas (Russo and Ford, 2006). It also encourages them to search and investigate why something went wrong, and to then make the required smart changes, rather than just doing what they have been told to do (Pacheco, 2005).

Teachers' abilities to reflect on their actions are vital factors which influence their professional development (Clarke, 1995). They need to regularly engage in the process of reflection, which involves self-examination and self-evaluation, in order to develop their professional practices (Shandomo, 2010). Nowadays, reflective practice is an important tool for teachers' professional development (Fakazli and Gonen, 2017). Teachers' training

programmes, in many educational institutions around the world, consider it as a path to enhance teachers' practices (Rodriguez, 2008). It is notable that education excellence relies mainly on the excellence of teachers and teaching, which indicates the crucial role of teacher training programmes to serve the purposes of improving the quality of teacher performance (Mathew et al., 2017). These programmes are important and significant in repairing and reinforcing the educational system (Mathew et al., 2017).

In some countries, these programmes focus on increasing the level of teachers' knowledge and on the ways of transmitting this knowledge to them effectively (Hung, 2008). The main task of such programmes is to teach them teaching, that is concerned exclusively with transferring knowledge to them and clarifying what they should be taught. However, many educators and policymakers have realised that effective teaching cannot be taught, but rather learned directly (Hung, 2008 and Richards, 1998). Liakopoulou (2012) considers reflection on teaching practices and the ability of analysing them fundamental processes for teachers to shape their theory about teaching.

Reflective practice should be the means of teachers' professional development in the beginning stage of their preparation. It supports pre-service teachers to decipher and analyse teaching strategies (Pacheco, 2005) and to integrate their new practical experience with their gained knowledge during their preparation stage (Mathew et al., 2017). It also helps in-service teachers to stop practising teaching based on routine or blaming students' abilities, and not their own methods of teaching for the decline in student achievement (Pacheco, 2005). This leads to sustained emphasizing on the importance of integrating reflective practice into teacher training programmes and therefore, those who prepare these programmes must think carefully about how to merge reflection in their programmes (Boud et al., 1985). It is a crucial matter for teachers to reflect on their actions to be able to choose the right action to take while facing problematic situations.

2.2.4 Levels of reflection and their measurements

Reflection has evolved and passed through multiple stages, and has been influenced by different philosophies which have contributed to the formation of some ambiguity in its meaning. Murphy and Ermeling (2016) state that *"despite this sustained emphasis on teacher reflection across several decades of publications and research, there is still limited evidence regarding the effects of reflective practice on teaching and learning and limited research on how educators might measure and obtain feedback on levels of reflection"* (p.318). Murphy

and Ermeling (2016) also indicate that researchers are not totally agreed in terms of the construction of the reflection or the levels that it entails. As a consequence of different definitions of reflective practice, and a wide range of their meanings, there is no generally accepted definition or determination of reflective practices' various levels (Akbari et al., 2010; Larrivee, 2008). There are different attempts to determine levels of reflection. The following table summarises the efforts of Choy and Oo (2012, p.169), Finlay (2008, p.5), and Mann, Gordon, and Macleod (2009, p.598), which shed light on researchers' opinions regarding levels of reflection and reflective practices.

Table 2.1: Levels of Reflection

Authors	Levels of Reflection
Dewey (1933) (as cited in Mann et al., 2009, p.598)	1. Content and process reflection 2. Premise reflection/critical reflection
Van Manen (1977, p.226-227)	1. Practical reflection 2.Technical rationality 3.Critical reflection
Mezirow (1991) (as cited in Mann et al., 2009, p.598)	1. Habitual action 2.Thoughtful action/Understanding 3. Reflection 4. Critical reflection
Boud et al. (1985, p.30)	1. Association 2. Integration 3.Validation 4. Appropriation
Hatton and Smith (1995, p.40)	1. Descriptive writing 2. Descriptive reflection 3. Dialogic reflection 4. Critical reflection
Moon (1999) (as cited in Mann et al., 2009, p.598)	1. Noticing 2. Making sense 3. Making meaning 4.Working with meaning 5.Transformative learning
Eby (2000) (as cited in Finlay, 2008, p.5)	1. Reflection 2. Self-awareness 3. Critical thinking
Jay and Johnson (2002, p.77)	1. Descriptive 2. Comparative 3. Critical reflection
Choy and Oo (2012, p.169)	1. Ability to self-assess 2. Awareness of how one learns 3.Critical reflection of self. 4. Reflection on beliefs about the self

We have discussed previously the pioneer efforts of Van Manen (1977) in determining reflection levels. He argues that reflection consists of three levels, 'practical reflection', 'technical rationality', and 'critical reflection' (Van Manen, 1977). After this attempt, many researchers have tried to identify reflective practice levels. In respect of reflection on journal writing, Hatton and Smith (1995) presumed four levels of reflection. These levels are, "*descriptive writing, descriptive reflection, dialogic reflection, and critical reflection*" (p.40). Kember et al. (2000, p.383-385) also identified four levels of reflection. These levels are:

1. Habitual actions

This level refers to the practice that is carried out automatically or with slight thought as a result of its frequent use by teachers. When an issue or an experience occurs many times for teachers, their way of dealing with it will be described as an entirely routine action.

2. Understanding

This level refers to a thoughtful action or a cognitive process that employs existing knowledge without trying to assess that knowledge. Thus, the resulted learning from this activity will not change or add anything to previous knowledge.

3. Reflection

This level of reflection entails the appraisal of presumptions of the content of the problem, or the procedures of solving it.

4. Critical Reflection

This level involves an attempt to change teachers' 'meaning framework' or knowledge. It is considered as the highest level in the study of Kember et al. (2000). This level occurs when teachers are aware of the reasons (beliefs, assumptions, and values) behind their existing feeling, actions, and thinking. This awareness may lead them to transform their knowledge system.

Another study, Larrivee (2008, p.342-343), suggests four levels of reflection. These levels are:

1. Pre-reflection

At this level, teachers are not interested in exploring alternative options of behaviours to deal with classroom situations, but act and react spontaneously and automatically without calculating the consequences. They do not ask questions the situation, taking it for granted. Their teaching is not influenced by students' interaction and needs.

2. Surface reflection

This level is concerned with how to achieve goals without considering their importance and values. The most vital thing is to attain the pre-selected aims and determine the technology needed to accomplish them.

3. Pedagogical reflection

This level occurs when teachers apply their knowledge and theories in the classroom, attempting to understand the theoretical backgrounds of their practices. At this level *"teachers reflect on educational goals, the theories underlying approaches, and the connections between theoretical principles and practice"* (Larrivee, 2008, p.343).

4. Critical reflection

This level concerns teachers' practices and the effects and consequences of moral and ethical issues on these practices. It entails testing the individual's values and belief system. It represents the acknowledging of the importance of considering the impact of social and political aspects on teachers' practices.

Previous attempts at determining levels of reflection show the extent to which there are differences in the literature reviews about levels of reflection which have led to a significant effect on the way of educators in assessing teachers' reflective practices. In order to establish an assessment tool of teachers' reflective practices, it is important to determine the levels or the components of these reflective practices, which can lead to providing a conceptual framework to develop this tool (Larrivee, 2008). Furthermore, these differences in the levels of reflective practices have led to a notable lack of effort in the preparation of a tool to measure teachers' reflective practices.

Yet, the researcher tried to carry out a comprehensive review in the literature about a valid and reliable measurement instrument of teachers' reflective practices. In terms of teachers' reflective thinking, many studies rely on Kember et al's. (2000) questionnaire. In terms of teachers' reflective practices, as mentioned previously, Larrivee (2008) created a survey for assessing teachers' levels of reflective practice that includes the following levels: *"pre-reflection, surface reflection, pedagogical reflection, and critical reflection"* (p.342-343). In addition, Choy and Oo (2012) prepared a questionnaire consisting of 33 questions with a Likert scale, including the following areas: *"ability of self-assess, awareness of how one learns, developing lifelong learning skills, and influence of belief about self and self-efficacy"* (p.171-173).

However, the present study employs Akbari et al's. (2010) instrument for the sake of answering the questions of the study that relate to reflective practices variables, as it seems more comprehensive than the other instruments. It is capable of achieving the study's

objectives, and few previous studies have examined its validity and reliability, such as (Yesilbursa, 2013), with a few researchers in various countries having employed it (Bayat and Molanaie, 2016; Keshavarzi and Fumani, 2015), and therefore it could suit the Omani context, especially as it has been applied in a neighbouring country.

Akbari et al. (2010) developed a tool in order to measure teachers' reflective practices. To this end, they reviewed several research papers in order to form an initial draft of behaviours that are believed to be relevant to teachers' reflections. As a result, they had more than 600 behaviours and categories of reflection, including management, planning, socio-political and cultural context, through which they developed their model of teachers' reflective practices (Akbari et al., 2010). Then, in the second phase, they eliminated the repeated elements or categories, leaving a total of 302 categories. In this phase, they also transformed the categories into sentences expressing reflective behaviours. Finally, the categories that had common purposes were grouped under one subject to represent what they all measure. As a result, six main components were formed, which were subsequently examined and reduced to five, including *"practical, cognitive, learner, meta-cognitive, and critical elements"* (Akbari et al., 2010, p.222).

1. Practical component

Akbari et al. (2010) describe practical components as those that encompass behaviours or items which represent the mechanisms and substantial actions of reflection. There are various types of these mechanisms and substantial actions, such as *"journal writing, lesson reports, surveys and questionnaires, audio and video recordings, observation, action research, teaching portfolios, group discussions, and analysing critical incidents"* (Akbari et al., 2010, p.214).

2. Cognitive component

The efforts of teachers regarding their professional development are the main concern of this component. They may involve *"conducting small-scale classroom action researches, attending conferences and workshops, and enriching own literature from many sources of literature"* (Lubis, 2017, p.31).

3. Learner component (affective)

This domain is mainly concerned with teachers' awareness about their students' learning (Lubis, 2017). Questions relating to students' methods of learning, and how they act

emotionally in their classes, are raised (Akbari et al., 2010). This component also focuses on how students' learning is affected by their cultural, linguistic, and behavioural backgrounds (Lubis, 2017).

4. Meta-cognitive component

Teachers' reflection on their principles, ideas, opinions, assumptions, and identity is raised within the items of this component (Akbari et al., 2010; Ashraf, Samir and Yazdi, 2016; Lubis, 2017). It also deals with teachers' formation of their emotional aspect and with their definition or description of their actions and practices (Akbari et al., 2010; Lubis, 2017).

5. Critical component

The social-political aspects related to teaching are addressed in this domain (Akbari et al., 2010; Ashraf et al., 2016; Lubis, 2017). The items of this component emphasize on the impact of teachers' practices from the political perspective, and they also focus on topics linked to gender, race, and social class (Akbari et al., 2010; Ashraf et al., 2016; Lubis, 2017).

2.2.5 Models of reflection

The researcher attempted to identify the most frequently used models of reflection that are cited in other studies in order to select one or more to rely on during the preparation of intervention activities. He discovered the following cycles:

2.2.5.1 Kolb's Cycle

Kolb (1984) benefited from the creative works of Dewey, Piaget and Lewin to form a cycle that explains how we learn. He contends that learning is experiential which means that you need to act in order to learn (McKimm, 2004). He also argues that experience plays a fundamental figure in the learning process and that knowledge is not constant but influenced, shaped and created by present and past experiences, rather than just from instruction (Bergsteiner, Avery, Neumann, 2010; Kolb, 1984; McKimm, 2004). The learning movement is led by clashes, argument and divisions, as learners start feeling, acting, and reflecting on the event (Bergsteiner et al., 2010). The cycle is called the 'Experiential Learning Cycle' and includes the following components: "*concrete experience (do), reflective observation (observe), the ability to form new abstract concepts (think), and the ability to test those in new situations (plan)*" (Bergsteiner et al., 2010, p.33; Healey and Jenkins, 2000, p.187; Kolb and Kolb, 2008, p.6).

Hence, according to this cycle, Kolb (1984) suggests that in order to make changes to individual knowledge, one must first begin with reflecting on previous experience. Then, this individual will be able to form new assumptions or theories in order to interpret the experience. Next, they must examine this new knowledge in a new situation. Finally, they can adopt and confirm that knowledge or theory, and use it for future experiences.
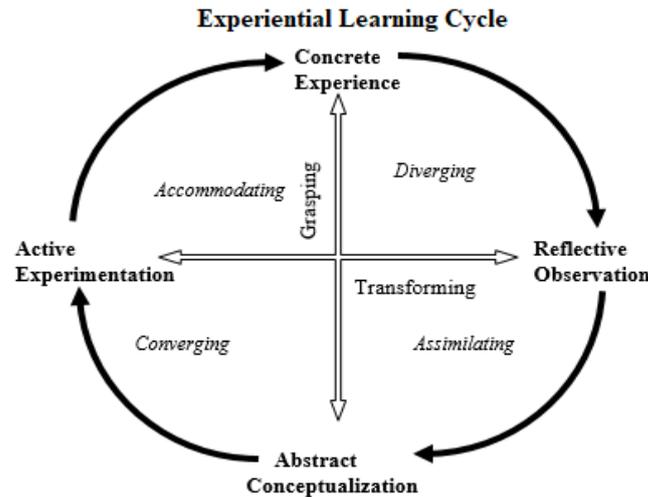
Figure 2.1: Kolb's Cycle (Kolb & Kolb, 2008, p.6)

2.2.5.2 Gibbs' Cycle

Another cycle which is utilised in many professional educations in order to develop reflection is Gibbs' Cycle. Based on Kolb's experiential learning cycle, Gibbs established a cycle that assumes *"theory and practice enrich each other in a never-ending circle"* (Finlay, 2008, p.8). One of his main additions was the stage for testing feelings (Bolton, 2014). It consists of six stages that aim to help an individual in forming a basic structure of reflection about a certain subject or event (Finlay, 2008). The individual has to reflect on both their beliefs and practices by asking themselves the following: *"What happened? (Description), what were you thinking and feeling? (Feeling), what was good and bad about the experience? (Evaluation), what sense can you make of the situation? (Analysis), what else could have you done? (Conclusion), and finally if it arose again what would you do? (Action Plan)"* (Bolton, 2014; Finlay, 2008, p.8).

Gibb's Cycle

Description
What happened?

Action Plan
If it arose again, what would you do?

Feelings
What were you thinking and feeling?

What else could you have done?

What was good and bad about the experience ?

Conclusion

Evaluation

Analysis
What sense can you make of the situation?
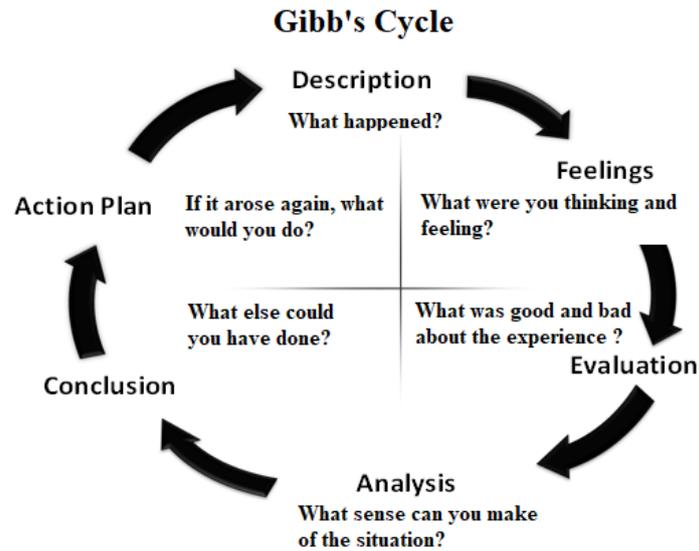
Figure 2.2: Gibb's Cycle (Finlay, 2008, p.8)

2.2.5.3 Boud et al.'s Cycle

Boud et al. (1985) established a reflective model consisting of three components: experience, reflective process, and outcomes. He divided the reflective process into three key stages. The first stage is relied on returning to an experience where the mind starts replaying, describing and viewing the details of the events. The second stage attends to feelings, in which the positive feelings are employed and the negative feelings are eliminated. The negative feelings may create a barrier towards rational thinking about the experience (Boud et al., 1985). The last stage in this process is 're-evaluating experience' where the experience is being tested again through four sub-stages (Boud et al., 1985; Finlay, 2008):

1. Connecting the resulting new knowledge from the previous one; that is 'association'.

2. Integrate that new knowledge with learners' conceptual framework; that is 'integration'.

3. Then, the reflective process is followed by implementing its outcome in real life to examine its validity; that is 'validation'.

4. The last stage involves adopting and appropriating the new knowledge; that is 'appropriation'.

Boud et al's. Cycle of Reflection
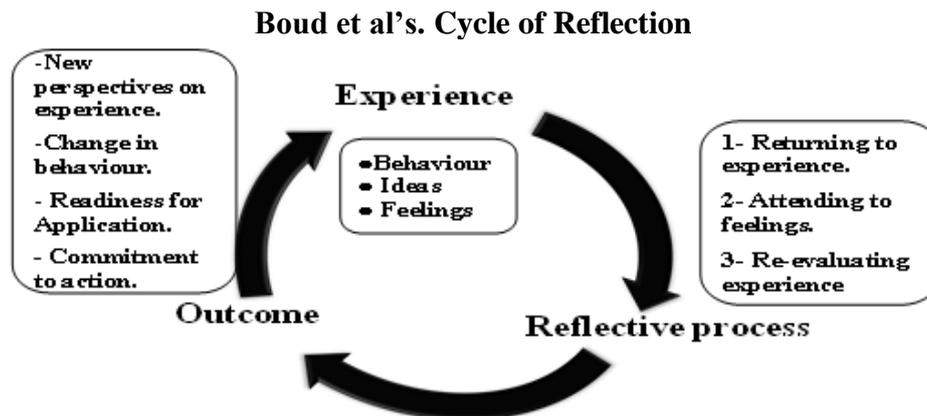
Figure 2.3: Boud et al's. cycle (Boud et al., 1985, p. 36)

The researcher stance

The identification of the most suitable model to be used in the context of this study depends on the extent of how close this model is to the following criteria:

1. The implementation steps and stages of reflection are limited so that teachers do not consider and view tasks as an undesirable burden that may affect their motivation improvement, which is the other variable of the study.

2. The chosen model must support and reinforce dialogue and debating between participants.

According to these criteria, the researcher has chosen Kolb's cycle which is simple and consists of only four stages. Gibb's cycle has also been selected because it is employed in many professional education systems and does not need much time to be achieved. However, he decided to avoid using Boud et al.'s Cycle because of the criticism directed towards this model of it only focussing on the participants' mental activity, and does not foster them to employ any reflective dialogue (Finlay, 2008). This might not be suitable for the context of the study as it uses mobile applications, which argues that one of its main affordances is to provide a virtual environment for interaction, and therefore the used model must serve the same purpose.

2.2.6 Promotion of reflective practices

The first step to promote reflection might be through educating trainers and educators on the reflective practices' role in enhancing the quality of teachers' practices and performances. Akhbari (2007) asserts that *"reflection is promoted by enlightened teacher educators as a way to improve the quality of teacher performance in the classroom; in*

addition, reflection is supposed to empower teachers" (p.198). Reed, Davis and Nyabanyaba (2002) argue that peer support can be a vital element to promote teachers' reflective practices. Yet, many studies suggest that it is possible to promote reflective practices through many platforms and ways, including action research (Ferraro, 2000; Rivera and Dann, 2011; Ross, 1990), reflective writing and reflective journals (Farr and Riordan, 2015; Ross, 1990), coaching and peer involvement, such as small and large-group discussions (Farr and Riordan, 2015; Ferraro, 2000), and online virtual discussion environments, such as blogs, forums, chat and electronic portfolios (Bodzin and Park, 2002; Harrington and Hathaway, 1994; Kirk, 2000; Farr and Riordan, 2015), partly form the core of this study which is concerned with enhancing teachers' reflective practices through using mobile applications as a platform.

2.3 Motivation

Introduction

It is very interesting to figure out why an individual behaves in a particular way. What is the secret behind being motivated to achieve a certain goal? Why does someone strive to exert hard and continuous efforts to achieve a particular task? In other words, what are the influences that foster an individual's desire to carry out a particular task? In contrast, what leads to extinguishing this desire and turn it off? These questions are very important and it seems that many studies in the current era have touched on them to a large extent. Apparently, research on this subject, motivation, have almost overwhelmed many types of research in the fields of education and psychology. Many articles and books have been written in order to answer these questions and many theories have been proposed (Baron, 1991). Perhaps motivation is something which stems from an individual's depth, or perhaps it is a result of being in a particular environment. It could be because of the values held by the individual or because of their opinions and expectations about themselves. In fact, it does not seem that the secret of motivation has been revealed. The existence of many contradictions and interpretations related to this concept make us realise that the road is still long to determine its reality in an absolute form. This section seeks to define motivation, and to reveal the role that it plays in the teachers' professional development field. Finally, it presents teachers' motivational influences and suggested motivational theoretical approaches.

2.3.1 Motivation definition

The Latin verb 'movere' means 'to move', and is the root of the motivation concept that refers to forces or factors that lead an individual to take a certain path, to choose a specific activity, and to exert sustained efforts in order to carry out that activity (Dornyei and Ushioda, 2013; Pintrich and Schunk, 2002). Motivation to act or to behave generally grows gradually based on complicated intellectual mechanisms that include *"initial planning and goal setting, intention formation, task generation, action implementation, action control and outcome evaluation"* (Dornyei and Ushioda, 2013, p.6).

There is wide disagreement among philosophers and researchers about the definition of motivation. Motivation is widely seen as the factors underlying individuals' actions or behaviours (Guay et al., 2010; Ryan, Lynch, Vansteenkiste, and Deci, 2011). Dornyei (2001) points out that *"motivation is an abstract, hypothetical concept that we use to explain why people think and behave as they do"* (p.1). Reeve (2005) claims that it is the *"processes that give behaviour its energy and direction"* (p.39). Baron (1991) argues that *"motivation is the internal processes that activate, guide, and maintain behaviour, especially goal-directed behaviour"* (p.1). Further, Pintrich and Schunk (2002) consider it as *"the process whereby goal-directed activity is instigated and sustained"* (p.5). It seems according to the previous three definitions that *"motivation is a process rather than a product"* (Pintrich and Schunk, 2002, p.5). This means that it is difficult to recognise motivation explicitly, but, it can be observed through individuals' behaviours (Pintrich and Schunk, 2002). This process includes orientation and momentum that results from an individual's goals (Pintrich and Schunk, 2002).

However, there are other different definitions that consider motivation as a result of an individual need or a condition of availability of engaging factors. For example, Achim, Dragolea and Balan (2013) define motivation as a group of consequences of an individual's needs that they strives to fulfil and to satisfy them, and for that purpose, they are driven to implement a set of activities and actions. Whereas, Evans (1998) considers *"motivation as a condition, or the creation of a condition, that encompasses all those factors that determine the degree of inclination towards engagement in an activity"* (p.34).

The current study adopts the definition that is shown in Vallerand's (2004) study, since it is more comprehensive and widely accepted (Vallerand, 2004), which defines motivation as *"the hypothetical construct that is used to describe the internal and/or external*

forces that lead to the initiation, direction, intensity, and persistence of behaviour" (Vallerand, 2004, p.427).

2.3.2 Importance of motivation

Regardless of the nature and objectives of institutions or organizations, they definitely need a group of staff who are characterised by their abilities and desires to achieve those objectives (Hollyforde and Whiddett, 2002). Certainly, employees' motivations have a significant influence on the productions of these institutions and organizations (Hollyforde and Whiddett, 2002). There is no doubt that every action, activity, effort or behaviour is a natural consequence of an existence of a motive. Baron (1991) argues that behaviour is a result of an individual's motivation.

Motivation itself is important for these organizations because of its stated value (Hollyforde and Whiddett, 2002). Many studies and researches indicate that there is a necessity to devote a great deal of effort to create a sustained environment that respects employees and seeks to achieve their job satisfaction, which could lead to reinforcing their intrinsic motivation (Hollyforde and Whiddett, 2002). The availability of motivation can help an individual to cope with the volatile conditions of life, and contributes to the rebalancing process of institutions and organisations that are exposed to shocks and fluctuations (Reeve, 2005). Some organizations may provide different incentive schemes in order to foster employees' motivations that may involve a promotions system or a warning/consequence system (Hollyforde and Whiddett, 2002). Each of these systems could suit certain employees. For those who wish to achieve promotion, their motivation will increase due to the promotion system in place, and for those who are worried about consequences or warnings, their motivation will also increase due to the system (Hollyforde and Whiddett, 2002). Regardless of the incentive system used in organizations, it is necessary to shape such systems in order to influence employees to behave in favour of work.

In terms of educational institutions, Vero and Puka (2017) believe that *"motivation is probably the most important factor that educators can target in order to improve learning"* (p.58). Some empirical studies have revealed that the association between teachers' motivation and their job satisfaction and performance is statistically significant and positive (Al Tayyar, 2014; Inayatullah and Jehangir, 2012). According to Malone and Lepper (1987), motivation is a vital element for being involved in any learning activities whereby the levels of its availability with learners may affect the effectiveness of their learning. Teachers'

motivation plays a crucial role and has a significant effect on learners' motivation and performance (Hapsari, 2013; Seebaluck and Seegum, 2013). Claudia (2015) argues that pupils' learning and the achievement of schools' objectives basically depend on teachers' motivation. In fact, motivating pupils to learn without having motivated teachers is not easily achievable, as the motivated teacher will do everything possible to create an enjoyable learning environment in which pupils participate effectively (Hapsari, 2013).

2.3.3 Influences that affect teachers' motivation

One of the main priorities of education officials around the world is to retain competent and qualified teachers (Muller, Alliata, and Benninghoff, 2009). Teaching in this era, the era of informational and technological revolution, is not an easy task, and teachers must be motivated enough in order to meet teaching demands. It seems that there is considerable pressure to reveal factors and processes that underlie the quality of teachers, especially in relation to the identity of the motives that are responsible for teachers' engagement, commitment, and persistence (Watt and Richardson, 2008).

Thus, the strongly posed question in the current study is what motivates teachers to teach? Richardson, Karabenick, and Watt (2014) have rated *"intrinsic value, perceived ability, the desire to make a social contribution, the desire to work with children, and positive prior teaching and learning experience"* (p.8) as the major factors of pre-service teachers to become teachers. While, Kyriacou and Coulthard (2000) summarise the major of reasons that lead an individual to work as a teacher, as follows:

1. Altruistic reasons: This individual may regard teaching as an important social service that includes helping learners to succeed, and thus contributing to the development of society in general.

2. Intrinsic reasons: This aspect indicates an individual's interest in practising some of the teacher's tasks such as the desire to deal with children.

3. Extrinsic reasons: This aspect points out some of the benefits that can be gained by working as a teacher, such as long holidays and good salary.

Although motivation depends heavily on individuals' personalities, which are extremely varied, it is hard to identify the best path to strengthen and stimulate employees' motivation because of their motivational factor differences (Hollyforde and Whiddett, 2002). Outside the scope of the academic community, the most widespread hypothesis is that

motivation has a strong correlation with payment (Evans, 1998). Evans (1998) argues that payment is a crucial factor in order to enhance job performance. Furthermore, Naseer UdDin, Tufail, Shereen, Nawaz, and Shahbaz (2012) claim that rewards and teachers' financial status and incentive are the main motivational factors leading individuals to become teachers. In general, an employee such as a teacher is willing to work hard and put in great effort if they expect to gain such reward. However, some studies show that salaries and financial benefits are not a motivator (Evans, 1998), or they are not a vital element for those who intrinsically motivated towards teaching (Muller et al., 2009).

Another factor that may affect teachers' motivation is self-efficacy, which represents to what extent an individual believes that they have the competence to deal with tasks or activities (Thoonen, Sleegers, Oort, Peetsma and Geijsel, 2011). The availability of self-efficacy with teachers could lead them to be more flexible with trying new ideas and teaching methods, showing more quality in planning levels, making more effort with learners who need help, and more ready to persist with achieving their goals (Thoonen et al., 2011). Yuan and Zhang (2017) argue that the ongoing interaction between *"self-efficacy, outcome expectations, professional autonomy, and social support"* (p.142) may shape teachers' motivation.

Beliefs of teachers in school values and goals are considered as a vital factor in teachers' motivation (Thoonen et al., 2011). This requires that teachers believe in these goals and values, and are willing to adopt them as their own goals and values (Thoonen et al., 2011). Thoonen et al's. (2011) study's findings reveal that *"internalization of school goals into personal goals mainly influences the extent to which teachers keep themselves up to date"* (p.517). Klassen, Al-Dhafri, Hannok and Betts (2011) claim that socio-cultural factor affects Omani teachers' motivation significantly. AlRasbi (2013) argues that Omani teachers' motivation towards working is affected by: *"interactions with school pupils, school leadership, relationships with colleagues, recognition, participation in making school decisions, continuing professional development, relationships with parents, equity, and salary"* (p.186).

2.3.4 Theoretical approaches of teachers' motivation

Energy and direction of the individual's behaviour are considered as core to the inquiry process of their motivation (Deci and Ryan, 1985). Energy refers to the individual's needs, while direction gives meaning to their action (Deci and Ryan, 1985). Motivation

theories are often based on a collection of hypotheses about the nature of individuals and about the factors that give the action the momentum it needs (Deci and Ryan, 1985). There are many theories that attempt to explain motivation and reach all of its related factors. For example, social cognitive theory, attribution theory, self-determination theory, achievement goal theory, expectancy-value theory. According to Richardson et al. (2014, p.xv) and Hiver, Kim, and Kim (2018, p.2), *"the expectancy-value theory, achievement goal theory, and self-determination theory"* are the main motivational theories that are adapted in order to highlight and explore teachers' motivation empirically. Thus, this study focuses on these theories in detail.

2.3.4.1 Self-determination theory

The self-determination theory assumes that people naturally want to believe that they are doing an activity or a task because of their personal desire, not because they are forced to do so (Stipek, 1998). It highlights the tendencies to choose freely and to obtain these choices instead of being forced to behave and act in a specific way (Deci and Ryan, 1985). The individual, according to this theory, is more motivated and interested if they choose to undertake the activity, rather than being externally oriented to be engaged with that activity (Stipek, 1998). This approach requires an individual to accept his strengths and weaknesses, be aware of the forces that affect them, and have the ability to choose and determine ways to meet their needs (Pintrich and Schunk, 2002). It draws on exploring the individual's deep-rooted growth inclination and their innate psychological needs (Ryan and Deci, 2000). These are the bases that form their motivation and personalities (Ryan and Deci, 2000).

Competence, autonomy, and relatedness are the major inherent psychological demands that construct the ground for the theory of self-determination (Ryan and Deci, 2000). Anderman and Anderman (2010), and Pintrich and Schunk (2002) interpret these needs as follows- competence needs indicate a person's desire to feel that they have the ability to implement certain tasks and activities, or to interact with others. Autonomous needs indicate an individual's desire to feel self-directed, or to have a sense of control. Finally, a relatedness need is related to the individual's desire to feel linked and accepted inside a broad social network, or to feel that they are part of a group.

According to this theory, people are motivated to perform tasks and activities that underpin their efforts to meet these needs (Anderman and Anderman, 2010). Typically, self-determination theorists focus their efforts on matters related to intrinsic and extrinsic

motivation (Anderman and Anderman, 2010). This predicts the decline of an individual's intrinsic motivation if they believe that an extrinsic motivation controls their actions and behaviours (Pintrich and Schunk, 2002), since intrinsic motivation is derived from the *"individual's innate needs for competence and self-determination"* (Deci and Ryan, 1985, p.32).

Intrinsic Motivation versus Extrinsic Motivation

Despite believing that motivation is a singular structure, people perform tasks for different reasons and as a result of their exposure to various experiences (Ryan and Deci, 2000). Therefore, some of them may carry out an activity because they value and appreciate it, or they have a personal commitment towards carrying it out. Some of them may implement an activity because they are being oriented by external forces (Ryan and Deci, 2000). This diversity of internal and external causes highlights the necessity to study them. Psychologists have long recognised that several kinds of motivation are there. The most important of which are intrinsic motivation and external motivation (Vallerand, 2004). Bearing in mind that the same task could motivate different individuals intrinsically or extrinsically, Pintrich and Schunk (2002) point out that both intrinsic and extrinsic motivation are not independent but rely on time and the context of the activity. This means that it is possible for an activity to motivate an individual intrinsically, whereas it motivates another individual extrinsically. This also means that in time an activity may lose its capability to motivate a person who has been previously motivated by it, either intrinsically or extrinsically (Pintrich and Schunk, 2002).

Furthermore, there is no specific relation between intrinsic and extrinsic motivation. The relationship between them is neither direct nor inverse or constant; the individual, for any given task, could be described high in both or low in both, or high in one and low in the other (Pintrich and Schunk, 2002). Intrinsic motivation means performing a task for obtaining satisfaction (Anderman and Anderman, 2010; Pintrich and Schunk, 2002; Ryan and Deci, 2000; Vallerand, 2004), while, extrinsic motivation means performing a task for gaining some sort of reward, or to avert external threats or punishment (Anderman and Anderman, 2010; Pintrich and Schunk, 2002; Ryan and Deci, 2000; Vallerand, 2004). Intrinsic motivation encompasses three types - knowledge (performing a task for learning), accomplishment (performing a task for the pleasure of attempting to outperform oneself), and stimulation (performing a task for the sake of aesthetic satisfaction) (Vallerand, 2004). Pintrich and Schunk (2002) argue that in order to improve intrinsic motivation, the highlight

has to focus on four origins: challenge, curiosity, control, and fantasy, whereas, extrinsic motivation encompasses *"four types, which are: integrated regulation, identified regulation, introjected regulation, and external regulation"* (Ryan and Deci, 2000, p.72). The following table explain each type:

Table 2.2: Types of extrinsic motivation

Components	Definition
External Regulation	Behaviour that is derived from extrinsic rewards and demands (Ryan and Deci, 2000).
Introjected Regulation	Observed when the *"behaviours are performed to avoid guilt or anxiety or to attain ego enhancements such as pride."* (Ryan and Deci, 2000, p.72)
Identified Regulation	Observed when an individual practises an activity due to their belief that implementing the activity is important for them (Pintrich and Schunk, 2002; Ryan and Deci, 2000).
Integrated regulation	*"Integration occurs when identified regulations are fully assimilated to the self, which means they have been evaluated and brought into congruence with one's other values and needs"* (Ryan and Deci, 2000, p.73). In other words, a person with integrated regulation carries out the activity because of its *"importance to his/her sense of self"* (Pintrich and Schunk, 2002, p.263).

Note that amotivation represents *"the relative absence of individual motivation"* (Vallerand, 2000, p.312), whereby a person does not have a competent feeling (a perceived decline in their efficacy) (Pintrich and Schunk, 2002). If a student or a teacher has this pattern of motivation, then they suffer from an absence of, or a significant decline in, motivation towards school work (Pintrich and Schunk, 2002).

2.3.4.2 Achievement goal theory

Goals direct an individual's behaviours and give meaning to their actions (Kaplan and Maehr, 2007). Achievement goal theory is concerned with determining types of goals that control and orient an individual's achievement-related actions (Zusho and Maehr, 2009). Urdan and Maehr (1995) define it as *"students' perceptions about the purposes or meaning of academic work, achievement and success"* (p.215). Achievement goal theory proposes that people do what they can and exert effort on an activity or a task in order to achieve significant goals (Baron, 1991).

The main interest of this theory is not on what learners are attempting to perform in an academic setting, but typically on their perceptions of why they are attempting to perform it (Urdan and Maehr, 1995). This theory differentiates between two types of goals: mastery (or learning of task) goal, and performance goals (Senko, Hulleman and Harackiewicz, 2011; Urdan and Maehr, 1995). Mastery goals pay attention to possessing and enhancing competence (Senko et al., 2011) through *"learning, understanding, developing skills, and*

mastering information" (Kaplan and Maehr, 2007, p.142). Their main idea revolves around the claim that success will be gained through effort, and focuses on the aspects related to the personal development (Dornyei and Ushioda, 2013).

In contrast, performance (or ability) goals concentrate on proving that someone's competence exceeds the competence of others (Senko et al., 2011; Urdan and Maehr, 1995). Learning is looked at only as a way of attaining goals and the general recognition that accompanies it (Dornyei and Ushioda, 2013). According to Urdan and Maehr (1995), many studies show that these two types of goals are highly helpful in forming an obvious view of learners' achievement motivation. For example, a learner may seek to obtain a high degree in a particular material. The achievement goal theory, in this case, interprets the objective behind this intention through two dimensions: the student might have a desire to gain a distinct understanding of the content, or from a reverse angle, it is just an attempt by the learner to show that they are smarter than the rest of their colleagues (Zusho and Maehr, 2009).

2.3.4.3 Expectancy-value theory

The efforts of psychological theorists have not stopped in order to clarify the reasons for individuals' choices of tasks, and their insistence on implementing them (Wigfield and Eccles, 2000). According to these theorists, there are different views of the nature of the impact of motivation on individuals' choice, persistence, and performance (Wigfield and Eccles, 2000). During the 20th Century, the formation of motivation theories was in accordance with the cognitive view that occurred as a result of the behavioural view (Dornyei and Ushioda, 2013). The *"expectancy value theory is the most long-standing and influential framework in cognitive motivational psychology"* (Dornyei and Ushioda, 2013, p.13). This theory contends that people's beliefs in their ability to carry out a certain task well, and their evaluation of the value of this task, are the main reasons behind their choice, persistence, and performance (Wigfield and Eccles, 2000). This is based on the idea that the motivation of the individual increases by boosting the perception level of their ability to achieve goals, and also by enhancing the value of the incentives associated with goals (Dornyei and Ushioda, 2013). In other words, the expectancy-value theory assumes that motivation towards carrying out an activity will depend on two main key factors: expectancies for success which refers to what extent they believe that they will do well in the activity, and subjective task values which refers to how valuable the activity is for them (Savolainen, 2012; Wigfield and Eccles, 2000). Thus, the expectancy-value model, which is called *"a social cognitive expectancy-value*

model of achievement motivation" (Pinhtrich and Schunk, 2002, p.61), will certainly rely on the two fundamental components which are: expectancy and subjective task value (Pinhtrich and Schunk, 2002; Sun, Ding, and Chen, 2014; Wigfield and Eccles, 2000). The model of this theory was developed by Jacque Eccles and Allan Wigfield, and their colleagues (Pintrich and Schunk, 2002). It explains the various variables that may directly or indirectly affect these two factors (expectancy and task value), as the following figure shows:
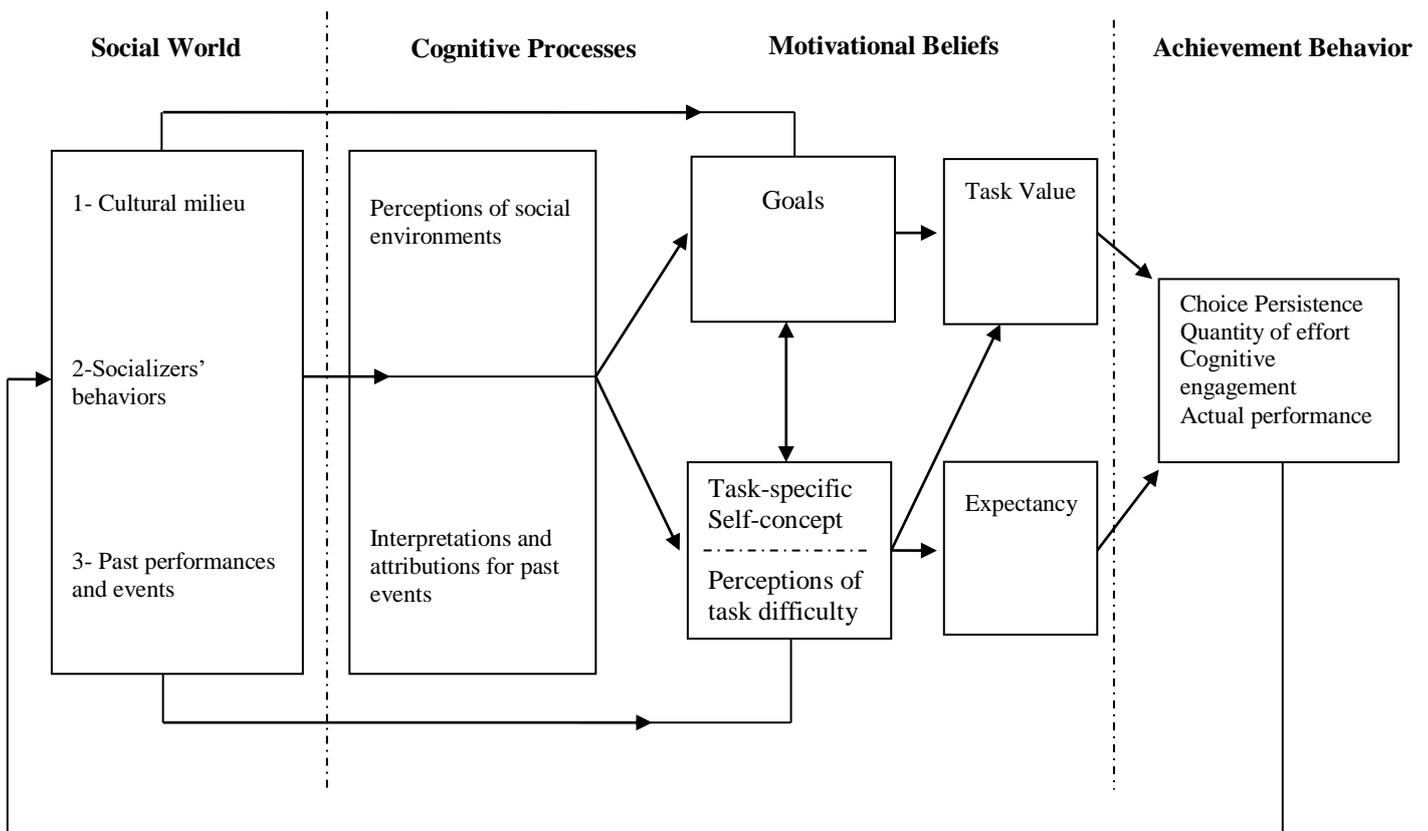
Figure 2.4: A Social Cognitive Expectancy-Value Model of Achievement Motivation (Pinhtrich and Schunk, 2002, p.61)

Based on this model, there are two dimensions for an expectancy factor. These are: *ability beliefs* that are the present ability to carry out the activity, and *expectancy beliefs* which refer to the future ability to carry out the activity (Wigfield and Eccles, 2000). Whereas there are four dimensions for the subjective task value, which are *intrinsic value,* the interest or enjoyment that the individual may get as a result of implementing the activity, *utility value* that refers to the realisation of the extent to which the task or activity connects to the present and future objectives, or it refers to the usefulness of the activity in achieving goals related to future plans (Wigfield and Eccles, 2000). *Attainment value* points out to the

person's awareness of the significance of becoming proficient in skill and in doing well in an activity, and finally *cost* which refers to how engaging in an activity will decrease the opportunity of taking part in other activities, an assessment of the effort needed to achieve the activity, and the emotional cost if the individual faced obstacles or failed to achieve the activity (Dornyei and Ushioda, 2013; Kosovich, Hulleman, Barron, and Getty, 2015; Savolainen, 2012; Wigfield and Eccles, 2000).

The activities of this study which aim to enhance science teachers' motivation towards teaching and planning lessons have been designed based on the expectancy-value theory of motivation. The researcher has chosen to utilise this theory which is, as mentioned previously, the *"most long-standing and influential framework in cognitive motivational psychology"* (Dornyei and Ushioda, 2013, p.13), due to his belief that it could fit well with the reflective practice models, or in other words with the suggested professional development programme of this study, and further because it is apparently easier to be applied than the other two theories. The idea of these motivational activities is to use mobile applications in order to develop science teachers' expectancy (two dimensions) and their task values (four dimensions) towards teaching and planning lessons which may lead to enhancing their motivation towards these two aspects (teaching and planning). The theoretical framework for the current study's activities is shown in the following figure:
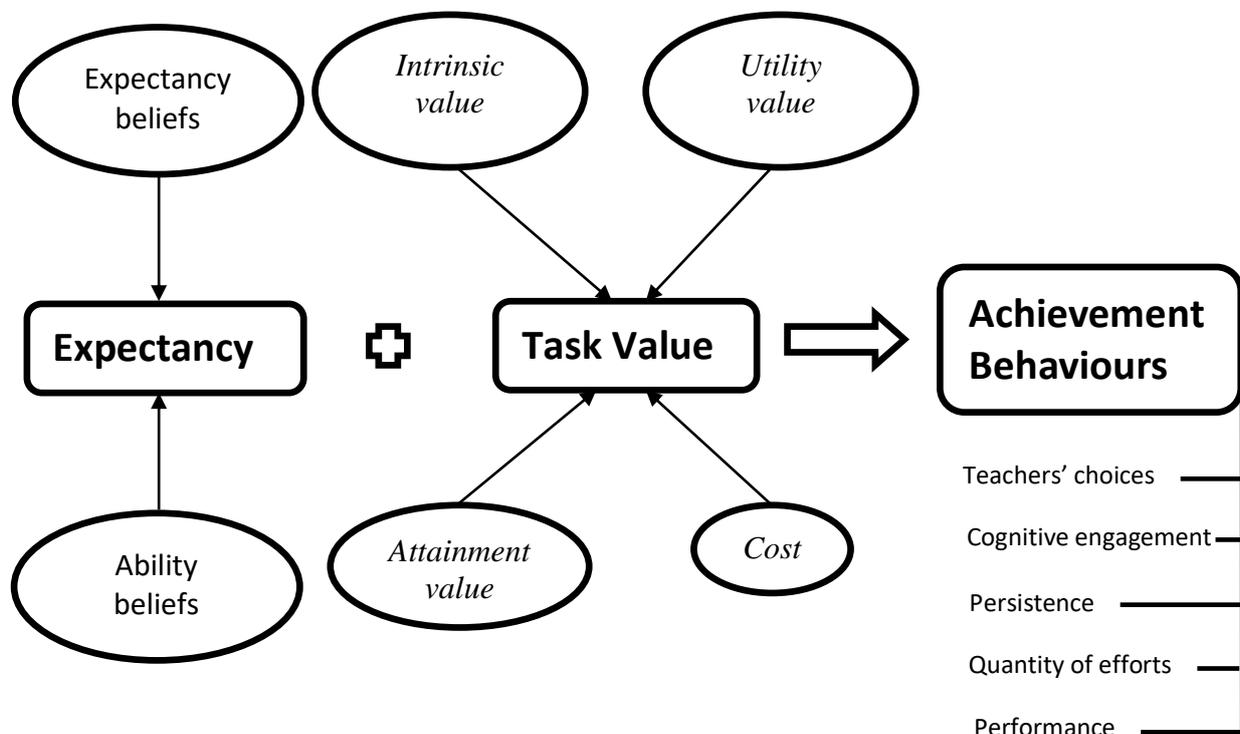
Figure 2.4: The theoretical framework for the study activities according to the expectancy-value theory

Section Two: Empirical Studies

Introduction

This section discusses empirical studies regarding mobile technology, motivation, and reflective practices. It also covers studies that employ virtual environments (online sites, blogs, chat, e-portfolio, and forums) in order to improve teachers' reflection or motivation. Furthermore, it shows certain studies that relate to Facebook, Twitter, teachers' reflective practices, motivation and teachers' motivational factors. Finally, this section reveals how to estimate the likely effect size of the study.

2.4.1 Mobile technology studies

Mainly, mobile technology studies clearly pay considerable attention to showing the significance of mobile technology for the purpose of developing teaching and learning quality (Akhshabi et al., 2011; Mohammadi, 2015; Motiwalla, 2007; Read and Kukulska-Hulme, 2015; Rau, Gao and Wu, 2008). A review of the empirical studies reveals that the overall impact of employing mobile technology in educational interventions is greater and better than employing desktop computers, or not using mobile devices as an intervention (Sung et al., 2016). Mobile devices could be exploited to foster the positive impacts of some pedagogy, such as self-directed learning and formative assessment (Sung et al., 2016). This is due to their extraordinary characteristics as individualised interfaces, with on-the-spot access to data, context sensitivity, and instant communication (Sung et al., 2016).

Chaiprasurt and Esichaikul (2013) investigated the impact of using mobile technologies and Moodle as communication tools, on enhancing learner motivation and also on learners' interactions with peers and instructors. The findings revealed that employing these communication tools contributed significantly to developing learners' motivation, especially in regard to their attention and engagement. Abachi and Muhammad (2014) conducted a study to reveal the opinions of learners and educators on using mobile technology. The findings show that despite some security concerns, they both support employing mobile technology in an educational environment.

In contrast, some studies focus on different fields, such as the field of teachers' professional development, where using this technology could be beneficial. Certainly, professional development is a fundamental approach for updating teachers' professions and ensuring that they have the skills needed (Timperley, Wilson, Barrar, and Fung, 2007). Merging mobile technology into teachers' professional development requires an

improvement in their content knowledge, practices and attitudes (Ekanayake and Wishart, 2015).

Recently, rare studies have emphasised the use of this technology in teachers' preparation programmes, and in their training programmes, in order to find solutions for the difficulties facing the process of upgrading teachers' abilities and skills. For example, Len-Kibinkiri (2014) conducted a study to explore the links between mobile learning and pre-service teachers' professional development in Cameroon. The outcomes indicate that learning by mobile has a key impact on their professional development, which suggests the need for developing a positive view of mobile learning by educational institutions.

Young (2016) explored the attitudes of 259 teachers in 22 post primary-schools in Ireland towards employing tablets and iPads. The findings revealed that these technologies could be helpful in teachers'acquiring new technology-enhanced pedagogies, and they might have a positive effect on teachers' professional development.

Cansoy (2017) examined the impact of using WhatsApp (a type of mobile application) as an online platform to underpin science teachers' professional development. The findings indicated that using technology that involves online chatting opportunities has a capability to secure teachers' professional development.

Obiefuna and Offorma (2014) explored the perception of primary school pre-service teachers in Nigeria regarding employing mobile technologies in teaching. Data were collected through a survey. The findings indicate that pre-service teachers believe that mobile technology has to be utilised in their preparation.

Mehdipour and Zerehkafi (2013) examined the effect of mobile devices on educational processes. The results indicate that learning by mobile is helpful for overcoming constraints of place and time and for providing training when it is required.

Comments on the previous studies

Mobile technology, as the previous studies argue, can be beneficial in terms of learning and teaching processes. It has the capability to enhance learners' motivation and practices. Both learners and educators support employing mobile technology in educational environments. Employing this technology has been found to be better than employing desktop computers. Furthermore, utilising mobile technology in teachers' training programmes has a positive impact on their professional development. It seems that there is a

dearth of studies that have employed mobile technology to improve teachers' reflective practices. The present study could be considered as an attempt to fill this gap.

2.4.2 Studies employ virtual environment (online sites, blogs, chat rooms, e-portfolio, e-journals and forums)

Researchers mainly employed online sites, blogs, chat rooms, e-Portfolio, e-journals and forums in order to improve teachers' reflections. For example, Kirk (2000) revealed the impact of chat rooms on pre-service teachers' reflections. The findings show that these types of platforms have allowed pre-service teachers to react well together, which led to an increase in their number of reflective phrases.

Bodzin and Park's (2002) study's purpose was to investigate the impact of web-based forum for facilitating reflective discourse with pre-service teachers. The findings revealed that there is an improvement in pre-service science teachers' reflection when they employ such forums.

Collin and Karsenti's (2012) study showed the effect of online interaction on enhancing pre-service teachers' reflective practices. The findings revealed that *"teachers who got involved in online interaction showed evidence of several functions of reflective thinking and overall reflection on quality"* (Collin and Karsenti, 2012, p.46).

Hung (2008) investigated the utilisation of the reflective practice approach through the online learning community to develop pre-service teachers' practices and their professional identity. The findings indicate that encouraging pre-service teachers to practise reflection through using online learning communities is useful for developing their teaching practices and professional identity.

Farr and Riordan (2015) conducted a study to validate the suitability and affordances of different technologies such as online chat, discussion forums, and blogs as reflective platforms. The findings indicated that pre-service teachers' reflective practices were improved by using blogs, while emotional and affective engagement was fostered by using chat and forums.

Ray and Hocutt (2006) outlined the effect of using blogs by in-service teachers on their perceptions and practices. The results show that using blogs could promote their reflective practices, collaboration, and social interaction.

Yang (2009) examined the employment of blogs as a reflective platform for 43 pre-service English teachers (EFL) in a training programme in Taiwan. The blog included a

discussion forum used for helping pre-service teachers to explore their own reflection process. The data sources were pre-service teachers' posting messages, recorded group reflective dialogues, and surveys on their reflective experiences. The results show that pre-service teachers were reflective, and believed this technology to be a helpful platform for practising reflection and communicating purposes.

Nambiar and Thang (2016) explored the use of blogs as a platform for participation and reflection which may support teachers' professional development. The data analysis showed that utilising blogs helped teachers to develop their reflective practices to a certain extent.

Parkes, Dredger, and Hicks' (2013) study, on the other hand, showed that the ePortfolio has a potential to be the right platform to measure and support pre-service teachers' reflective practice.

Salinas-Grandy's (2016) study examined how an ePortfolio could support the improvement of reflective practices among pre-service teachers. The findings show that the ePortfolio has the potential to enhance teachers' reflective practices.

Tavil (2014) investigated the impact on self-efficacy of pre-service teachers by using e-journals for self-reflection. It also aimed to reveal the nature of correlation between self-reflection and self-efficacy levels. Data were collected quantitatively and qualitatively, with the findings showing that reflective e-journals helped teachers to be more efficient and confident.

Comments on previous studies

Previous studies have indicated that using web-based discussion forums, online chat, e-Portfolio, e-journals, and blogs as reflective platforms have the potential to enhance teachers' reflective practice, and as a result, improving their teaching practices.

2.4.3 Educational studies related to Facebook and Twitter

There have been many attempts to employ social networks to enhance learners' motivation. For example, Price and Kadi-Hanifi's (2011) study, which used social networks such as Facebook to increase learners' motivation, described this method of applying technology as e-motivation. The study demonstrated the effectiveness of such a method in supporting learners, encouraging them to interact, and increasing their motivation for learning. Furthermore, many studies concluded that Facebook is an appropriate platform for interaction among learners with various experiences and knowledge (Sirivedin et al., 2018).

Kajornboon (2013) conducted a study to reveal the impact of employing Facebook to foster interaction between learners and English teachers. The findings show that teachers' teaching skills and learners' writing skills improved.

In another study, da Cunha Junior et al. (2016) investigated teachers' utilisation of Facebook as a collaborative online atmosphere in order to foster their communication in diverse schools in the southeast region of Brazil. The outcomes indicated that teachers are in favour of collaborating in smaller groups, especially if the groups are from their schools.

Kustijono and Zuhri's (2018) study showed that using the Facebook app for educational purposes is valid conceptually and technically, since it is featured with low cost, simplicity, high accessibility, and efficiency.

Sirivedin et al. (2018) explore the possibility of utilising Facebook to improve English language teachers' writing skills. 17 participants used Facebook for six weeks, and the findings showed that Facebook enhanced English teachers' writing skills and their learning attributes, such as confidence, fluency, and satisfaction.

In contrast, Junco and Cotten's (2012) study found that engaging with Facebook has a negative impact on students' overall college GPA.

Bista's (2015) study reveals that Education graduate students had positive opinions about utilising Twitter as a new pedagogical platform for 15 weeks. It also highlights the potential of employing Twitter for professional development.

In another study, Blair (2013) examined the capability of Twitter to enhance learning. The findings revealed that Twitter improved learners' engagement and provided them with the opportunity to democratise their learning.

Ebner et al. (2010) explored the effect of the Twitter platform on students' learning in Higher Education. The findings indicate that Twitter can foster and underpin informal learning outside classrooms.

Comments on previous studies

The previous studies indicate that using Facebook could support learning and increase learners' motivation towards learning. It is a suitable platform for learners' interactions. Facebook has the potential to develop teachers' teaching skills. The findings indicate that Twitter is capable for the purposes of professional development and for fostering learners' engagement.

2.4.4 Studies related to teachers' reflective practices

Studies indicate that teachers gain many benefits through practising reflection. Ferraro (2000) pointed out that *"the primary benefit of reflective practice for teachers is a deeper understanding of their own teaching style and ultimately, greater effectiveness as a teacher"* (p.4). He also added other benefits, such as testing teachers' values and recognising the diversity during linking theories to teaching practices (Ferraro, 2000). Other studies draw attention to other examples of benefits, such as to enhance teacher's ability to understand them-self (Akbari, 2007), to become effective in developing their teaching and learning levels, and to be conscious of classroom activities and events (Fatemipour, 2013). Reflective practice is teachers' meaning to improve student's learning through knowing and empowering their strengths, and to provide ideas and proposals in order to deal with difficult situations (Rezaeyan and Nikoopour, 2013).

Ahmed and Al-Khalili (2013) explored the effect on primary science pre-service teachers' teaching skills by employing a reflective teaching approach. A questionnaire was used for collecting data. The results revealed that the approach was powerful in improving teaching skills, such as lesson-planning, classroom management, and evaluating their teaching and learning process.

Rodriguez (2008) explored the impact of a professional development programme (using the reflective teaching process) on two in-service teachers at a public university in Bogota. Interviews, observation, videotaping, questionnaires and a diary were used in order to collect data. The results indicated that their teaching practice improved. The findings also showed the flexibility to change beliefs and practical theories, time for evaluating actions, commitment, motivation, awareness, personalities, life experience, natural ways of interacting, and knowledge affecting teachers' attitudes towards practising reflection.

Orjuela and Delgadillo (2014) investigated the impact of peer feedback on teachers' reflective practices. The findings showed that peer feedback has a powerful influence on reflective practices. This approach helps teachers to identify their strengths and weaknesses and it increases their confidence.

Blackwell and Pepper (2008) aimed to identify the impact of utilising concept mapping to improve pre-service teachers' reflective instructional decision-making. Data analysis shows that there is no difference between teachers who use concept maps to plan

instructional lessons and those who do not use concept maps in their instructional decision-making.

Aldahmash, Alshamrani, and Almufti (2017) explored the extent to which high school science teachers in Saudi Arabia practise reflection. For the purpose of collecting data, a questionnaire was used. The data analysis revealed that science teaches practise reflection at a high level. The findings also show that practising reflective activities does not significantly differ according to gender and experience.

Faghihi and Anani Sarab (2016) aimed to reveal the level of reflective practices of English language teachers. Data were collected by a questionnaire and by observing some teachers' teaching practices. The findings showed that teachers' levels of reflective practice are low.

Ansarin, Farrokhi and Rahmani (2015) revealed the status of Iranian EFL teachers' reflective practice. For the purpose of collecting data, a questionnaire was used. The results indicated that those teachers are essentially at a pedagogical level of reflection. The results also indicated that a statistically significant association is there between teachers' qualifications and their critical reflection levels.

Dervent (2015) identified the impact of reflective thinking on pre-service physical education teachers' practices. This also revealed their reflective levels. Reflective journals, interviews, and video recordings of micro teaching sessions were used for the purpose of collecting data. A content analysis approach was employed in order to analyse data. The findings showed that they were at the technical level of reflection. This framework enabled them to be more aware of their professional development (planning, time management, and use of school facilities).

Gungor (2016) aimed to foster pre-service teachers' reflective practice levels by employing video recorded microteaching sessions, reflective journals, and lesson plans. The results showed that these reflective tools were helpful regarding pre-service teachers' professional development. They allowed pre-service teachers to assess, understand, and enhance their reflective practices. They also provided the required platform for achieving deeper reflection.

McFadden, Ellis, Anwar, and Roehrig (2014) investigated developing reflective practices of secondary science teachers by using video annotation. The findings showed that

this technique could provide the online platform needed for developing teachers' reflective practices.

McConnell et al. (2008) revealed the impact of videotaped recordings of teachers' practice on their reflective practices. The data analysis shows that using videotaped recordings increases teachers' teaching efficacy and supports their reflective practices.

Motallebzadeh, Ahmadi, and Hosseinnia (2018) examined English Foreign Language teachers' teaching effectiveness and its relation to their reflective practices. The results showed that the association between them was positive and significant.

Moradkhani, Raygan, and Moein (2017) examined the association between the reflective practices of EFL teachers and their self-efficacy. A survey and interviews were used for the purpose of collecting data. The results showed that the association between them is positive and statistically significant.

Comments on previous studies

The reflective practice approach is an important approach for the purpose of improving teachers' skills, or for fostering their teaching effectiveness. It could also support increasing teachers' self-efficacy. Some studies focused on identifying teachers' reflective practices, where other studies focused on determining strategies for increasing teachers' reflective practice levels. For example, a few studies utilised videotaped recordings of teachers' practice for teachers' professional development and for increasing their reflective practice levels. Furthermore, other studies argue that getting peer feedback has a positive and significant influence on teachers' reflective practices.

2.4.5 Motivation studies

Olasina (2012) examined learners' attitudes towards e-learning/m-learning devices and the impact of these devices on their motivation. The study outcomes indicated that despite e-learning/m-learning having a positive impact on students' motivation, they refused to use it as a replacement for face to face teaching.

Zohrabi and Yousefi's (2016) study's purpose was to investigate reflective teaching and its association with intrinsic motivation. Data were collected by two questionnaires of reflective teaching and intrinsic motivation. The findings revealed that the relationship between them is statistically significant and positive.

Kim and Keller (2011) carried out a study aiming to identify the impact of motivational and volitional email messages on the motivation of pre-service teachers. The findings show that the difference between groups in motivation is not statistically significant.

Al Tayyar (2014) aimed at revealing teachers' motivation and the extent to which it is associated with their job satisfaction, in Saudi Arabia. He also aimed to identify the factors that contribute to improving them both. For the purpose of attaining the aim of the study, Al Tayyar (2014) utilised both quantitative and qualitative approaches. In terms of the quantitative approach, 737 teachers completed a questionnaire, while he gathered the qualitative data by conducting interviews. The findings showed that teachers' job satisfaction is significantly associated with their motivation. They also showed that teachers are highly intrinsically and altruistically motivated, and they also revealed that teachers' motivation intrinsic, altruistic and extrinsic aspects are the main factors.

The association between satisfaction and motivation is also investigated by Ismail and Abd Razak's (2016) study. The findings indicated that the association between them is statistically significant.

Ali, Dahie and Ali, (2016) investigated the association between teachers' motivation and their performance. The findings showed that teachers' motivation is significantly associated with their performance.

Recepoglu (2014) aimed to reveal the levels of Turkey high school teachers' job motivation. This is a descriptive research in the survey model. Data were gathered quantitatively by a questionnaire (Job Motivation Scale). The results indicated that the component of commitment to the job was the highest level in the questionnaire, and motivation of male teachers was not significantly different than female teachers.

Can (2015) aimed to explore teachers' motivation levels towards working in the city of Mugla in Turkey. The sample of study consisted of 1310 teachers. Data were collected by a motivation instrument (Teacher Motivation Scale). The study's results showed that teachers' motivation levels towards working were high. They also showed that teachers' motivation levels do not vary significantly according to their years of experience.

Hein et al. (2012) aimed to explore the effect of different teaching styles on teachers' motivation. The data analysis revealed that teachers' intrinsic motivation to teach was higher than their extrinsic motivation.

Boset, Asmawi and Abedalaziz (2017) investigated the motivation of Yemeni English teachers' work, who teach at public secondary schools. Data were collected by a Multidimensional Work Motivation Scale. Analysing data showed that teachers have an overall moderate level of motivation. The results did not confirm the gender effect on teachers' work motivation, but they confirmed that years of experience directly affect teachers' work motivation.

Comments on previous studies

It seems that the association between the reflective practices of teachers and their motivation is statistically significant and positive. Some of the previous studies were interested in determining teachers' motivation levels. A few studies were interested in revealing the effect of various online tools on learners' motivation. It seems that there is a positive impact for a virtual environment on individuals' motivation. Other studies focused on studying the association between teachers' motivation and other variables, such as job satisfaction and school performance.

2.4.6 Teachers' motivation factors studies

There are various motivators that may drive teachers towards teaching in different ways. Addison and Brundrett (2008) explored influences that affect teachers' motivation in six primary schools in England, both positively and negatively. The findings revealed that extrinsic motivators (pupils' responses and workload) are the main influences that affect their motivation.

Alam and Farid (2011) identified influences that affect teachers' motivation in Rawalpindi city. The findings showed that the income status, economic status, students' behaviour, incentives and rewards, play a significant role in teachers' motivation.

Chireshe and Shumba (2011) investigated the reasons behind lack of motivation with Zimbabwean teachers. The study's sample was 62 teachers from primary schools. The data were collected by a questionnaire. The findings indicated that teachers' demotivation was a result of many factors such as: *"poor salaries, poor working conditions, poor accommodation, lack of respect, political harassment, overworking"* (Chireshe and Shumba, 2011, p.113).

Hildebrandt and Eom (2011) identified United States teachers' motivational influences. Analysing the data revealed five motivating influences: improved teaching, internal and external validation, financial gain, and collaboration.

Thoonen et al. (2011) explored the effect of motivational influences on the teaching practices of teachers in the Netherlands. A survey was used for collecting data. Analysing the data showed that the most significant motivational factor that interprets teachers' learning and teaching practices is their sense of self-efficacy.

Naseer UdDin et al. (2012) revealed the motivating elements that influence teachers' motivation. A questionnaire was used for collecting data. The results show that the key elements that influence teachers' motivation are the following – *"rewards and incentives, self-confidence, economic status of teacher, and financial incentive"* (Naseer UdDin et al., 2012, p.442).

Seebaluck and Seegum (2013) aimed mainly to identify the level of teachers' motivation in public primary schools in Mauritius, and to explore their motivators. Analysing the data showed that in general teachers' motivation is at a good level. The following factors motivate them - a sense of pride due to pupils' successful performance, social relationship with pupils, and teaching responsibilities.

Selemani-Meke (2013) examined influences that affect teachers' motivation in the Zomba Rural Education District in Malawi. Data were collected by interviews. The findings showed that teachers' lack of motivation was due to receiving unfair allowances, unfair salaries, and unfair promotions.

Daniels (2016) explored the positive and negative influences that affect teachers' professional motivation, in order to guide administrators regarding making their decisions about various issues, such as teachers' professional development. The findings showed that three main influences affect teachers' motivation - curricular, relational, and logistical influences. Data analysis also showed that there are roles for *"the master schedule, organization of time, and the condition of the physical environment"* (Daniels, 2016, p.61) regarding teachers' motivation too.

Han and Mahzoun (2017) aimed to examine demotivation influences of foreign EFL teachers at a primary and a secondary school in Turkey. Data were collected qualitatively (interviews, profile forms, field notes and diaries). The results showed that the main reasons for teachers' demotivation at work are school administration and colleagues' lack of communication, lack of interest, attention and respect from pupils.

AlRasbi (2013) investigated Omani teachers' perspectives about to what extent they are motivated. It also revealed the motivating elements that influence their motivation

towards working as teachers. The findings indicated that generally, Omani teachers considered themselves as highly motivated. These findings showed that enjoying working with students is one of their main motivating factors. Furthermore, the findings also indicated that being productive in society is another important factor of teachers' motivation.

Comments on previous studies

The previous studies indicated that pupils, workload, financial gain, and relationship with school administration and colleagues represent the major factors that affect teachers' motivation. In general, according to these studies, the following elements are the main factors of teachers' motivation - pupils' responses, pupils' behaviour, social relationship with pupils, enjoying working with pupils, getting sense of pride due to pupils' successful performance, workload, financial gain or income status (salaries), teachers' economic status, incentives, promotions, rewards, teachers' self-confidence, working conditions, political harassment, school administration and colleagues' communication, lack of interest, collaboration, teaching responsibilities, curricular factors, logistical factors, master schedule, organization of time, and being productive in society.

2.4.7 Estimating the likely effect size of the study

Farrokhyar, Reddy, Poolman and Bhandari (2013) point out that it is crucial to identify a priori sample size in order to minimize the risk of receiving an underpowered result, and to do so we need to determine the likely effect size estimation for the research variables. To achieve that, the researcher collected the effect size estimations related to teachers' reflective practices and their motivation variables from the data available in the literature. He relied on Google Scholar, ERIC, and University of York E-resources to collect, as much as he could, any studies whereby the domain related to teachers or pre-service teachers, and where the influence related to reflective practices and motivation. He collected more than 140 studies that met these inclusion criteria. Although studies have to be experimental in order to estimate effect sizes, the majority of studies that the researcher collected were descriptive. In fact, the researcher employed any studies that showed the impact of a specific treatment on teachers' reflection and their motivation, for the purpose of estimating the likely effect size of the study. Only a few examples were found that escaped the exclusion criteria, but these were sufficient to estimate a likely effect size for the present study. The following table shows these examples:

Table 2.3: Effect Size Estimations for the Study Variables

Authors (years)	Domain	Influence	Effect size (ES) Cohen's d	Standard Deviation	Sample size (N)
McKinney (2000)	4th grade level teachers	Extrinsic motivation	0.34[a]	0.47[a]	33
Kim and Keller (2011)	Pre-service teachers	Motivation toward technology	0.34	1.10[a]	56
Tekin (2015)	Omani early childhood pre-service teachers	Identified motivation Intrinsic motivation	0.57[a] 0.69[a]	1.22[a] 1.27[a]	62 62
Blackwell and Pepper (2008)	Pre-service teachers	Reflective instructional decision-making	0.64	14.99	85
Callens and Elen (2015)	Pre-service teachers	Critical reflection	0.71[a]	0.78[a]	63
Buzdar and Ali (2013)	Pre-service teachers	Critical Reflection Reflection	0.71 0.83	-	450 450

Domain: The targeted population. a: Calculated by the researcher from published data.
Influence: The dependent variable that is affected by the intervention. - : Information is not found.

Table 2.3 shows various estimations for the effect size on the research variables according to the literature. In terms of teachers' motivation effect size, McKinney (2000) used a Teacher Motivation Questionnaire to evaluate teachers' extrinsic motivation after being awarded. She compared them with those who didn't receive the pay award. The population of the study equals 188 teachers and the sample size is 33 teachers, where the effect size equals 0.34 for their extrinsic motivation. Another study, Kim and Keller (2011) conducted research in order to explore the impact of motivational email messages on pre-service teachers' motivation, volition, performance, and their stance regarding technology integration. The effect size of pre-service teachers' motivation toward technology integration equals 0.34 where the population of the study is 89 participants and the sample size is 56. Whereas, Tekin (2015) assessed the impact of *"cumulative grade point average (CGPA) on the motivation"* (p.1096) of Omani pre-service teachers towards teaching. This study population equals 90, and its sample size equals 62. The effect sizes for intrinsic motivation and identified motivation are 0.69, 0.57 respectively. Overall, these experimental studies on teachers' motivation have effect sizes in the range between Cohen's d= 0.34 and Cohen's d= 0.69.

In contrast, it seems that the effect size on teachers' reflective practices might be slightly higher than the effect sizes on teachers' motivation. The difference could be due to the complexity of motivation in terms of the ability for an investigator to find valid evidence

about it. It seems that noticing teachers' reflective practices (through teachers' behaviours and actions) could be slightly easier than noticing their motivation. For example, Buzdar and Ali's (2013) study reveals the impact of pre-service teachers' previous education on their thinking patterns, such as reflection and critical reflection, which are the highest levels of reflective thinking, according to Kember et al. (2000). The effect sizes in case of critical reflection and reflection equal 0.71 and 0.83 respectively. Another example is the study of Callens and Elen (2015) which is about writing a learning journal for reflective purposes. It shows that the effect size for pre-service teachers' critical reflection equals 0.71. The sample size of this study equals 63. Finally, the study of Blackwell and Pepper (2008) indicates that the effect size on pre-service teachers' reflection equals 0.64. This study aims to assess the effect of using concept mapping to enhance the reflective instructional decision-making of pre-service teachers when they attempt to improve the quality of their lessons. The sample size of it equals 85. Overall, the experimental studies on teachers' reflective practices have an effect size ranging between Cohen's d= 0.64 and Cohen's d= 0.83.

Although the domain and influence of some of these studies are not identical to the present study, it seems that they could be used to estimate the likely effect size of the study as they are similar to the present study with respect to variables and approaches. These studies show that the likely effect size for teachers' motivation variables might be little smaller than, the effect size related to their reflective practices. The range of effect sizes is approximately between Cohen's d= 0.34 and Cohen's d= 0.69 for their motivation, while the range of effect sizes is approximately between Cohen's d= 0.64 and Cohen's d= 0.83 for their reflection. Adding to all these, the study of Sung et al. (2016) which reveals that the effect size for applying mobile devices to education is 0.523, and the meta-analysis of Hattie (2009) shows the effect size of teachers' professional development equals 0.62. Therefore, it appears that a medium effect size of Cohen's d= 0.5 is suitable for estimating or assessing the necessary sample size in this study.

Note that the researcher estimated effect sizes of some studies in Table 2.3 based on the following equation:

$$\text{Cohen's d=} \frac{M_1 - M_2}{SD_{Pooled}}$$

Where M_1 and M_2 represent means of groups (Ellis, 2009).

Furthermore, the standard deviation should also be estimated, as Noordzij et al. (2010) point out that literature reviews, pilot studies and researchers' opinions are the sources for standard deviation estimation. Applying this to the previous studies of motivation, it is concluded that the experimental studies on teachers' motivation have standard deviations of a range between SD= 0.47 to SD= 1.27. As a result, the likely standard deviation for the current study is equal to the average of the standard deviations of these studies, which is approximately 1.0. Note that the researcher estimated the standard deviation of various studies in Table 2.3 based on the following equation:

$$SD_{Pooled} = \sqrt{\frac{(N_E - 1)SD_E^2 + (N_C - 1)SD_C^2}{N_E + N_C - 2}}$$

Where *"N_E and N_C are the numbers in the experimental and control groups, respectively, and SD_E and SD_C are their standard deviations"* (Coe, 2002, p.11; Ellis, 2009).

The implications of estimating the likely effect size and the likely standard deviation of the current study are discussed in Chapter Three (Research Methodology).

2.5 Summary of the chapter

This chapter discusses the theoretical frameworks and the empirical studies related to using mobile technology as an educational tool, teachers' reflective practices, and teachers' motivation. The chapter shows the potential of using mobile technology and virtual environments regarding teachers' professional development, especially with respect to their reflective practices and motivation. It discusses many aspects regarding teachers' reflective practices which are considered as vital to improving their teaching practices. It also presents the significant roles of teachers' motivation for fostering learning and teaching processes. Finally, this chapter identifies influences that affect teachers' motivation and which may thereby affect teaching effectiveness. It is concluded that reflective practice approaches may help to improve teachers' teaching skills, or their professionalism as teachers. Furthermore, motivation is shown in the literature to be an important factor for teachers' professional development. Both reflective practices and motivation could be enhanced through employing mobile technology, or through employing particular virtual environments. Thus, the integration of mobile technology with teachers' training programmes that aim to improve their reflective practices and motivation, could be significantly useful.

Chapter Three: Research Methodology

Introduction

The present study relies on a mixed methods approach, whereby qualitative and quantitative methods are combined together. Its main intention is to reveal the extent to which Omani science teachers are reflective and motivated towards teaching and planning lessons, and to explore the impact of using mobile technology on their reflective practices and motivation.

This chapter includes two major sections - the methodological framework, and the methodology (processes). The content of the first section describes the research design, the rationale behind using a mixed method approach, the study's population and sample, the study's instruments. After this, the following section addresses the study's procedures, the study's questions and its relation to the data sources, data analysis, the qualitative data's reliability and validity, and ethical considerations.

3.1 Methodological Framework

3.1.1 Research design

This study addresses using mobile technologies as a platform for teachers' professional development programmes. Two mobile applications (Twitter and Facebook) hosted a training programme that was designed based on two models of reflection (Kolb's Cycle and Gibb's Cycle), and on a motivational theory known as the Expectancy-Value theory. This programme intends to improve two significant key factors (teachers' reflective practices and their motivation) that contribute to developing teachers' professional practices. The design of this research involves three samples or groups of respondents: an experimental group and two control groups. The experimental group was given activities to enhance their reflective practices and motivation towards teaching and planning lessons by using mobile applications (Facebook and Twitter), while the control group1 was exposed to the same activities (Workbook) without using mobile applications, and finally the control group2 used mobile applications without relying on a certain professional development programme. All groups were chosen randomly and were initially identical in size. The design ensures that the differences in the findings of those different groups (if they exist) are due only to the impact

of the intervention. The following table summarises the design and also shows the difference between each group or condition:

Table 3.1: Research Design

	PRE-TEST	TREATMENT	POST-TEST
EXPERIMENTAL GROUP	YES	Activities using mobile apps (Facebook and Twitter)	YES
CONTROL GROUP (1)	YES	Activities without using mobile apps (only workbook)	YES
CONTROL GROUP (2)	YES	Using mobile apps without relying on certain activities	YES

3.1.2 Mixed methods research

The drive behind utilising mixed method approach is that some scholars think that the integration between qualitative and quantitative methods capitalises on the advantages and compensates for the disadvantages of each type of research (Creswell, Klassen, Plano Clark, and Smithet, 2011).

Defining mixed methods research is a controversial and diverse area (Johnson, Onwuegbuzie, and Turner, 2007). It is differentiated based on what is needed to be mixed, the goal behind mixing, the phases of the process of the mixed method research, and why we need to utilise such an approach. They define it as *"the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (for example, the use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration"* (Johnson et .al, 2007, p.123).

Meanwhile, Creswell and Plano Clark (2011) address the research design that includes the mixed method approach from two perspectives - philosophical assumptions and methods of inquiry, focussing on the benefit of using this approach in order to obtain greater clarification for research issues rather than solely utilising either a quantitative or qualitative method. Thus, as mentioned previously, the integration between both methods strengthens the research and reduces any undesired weaknesses. Furthermore, it is necessary to mention that applying this method increases the validity of the research findings as it allows triangulation to exist (Cohen, Mannion, and Morrison, 2011; Creswell and Poth, 2018). For these reasons, this research utilises this approach for attaining the purposes of this study.

3.1.2.1 Quantitative research

A phenomenon could be generally expressed by a quantity (Kothari, 2004). Measuring a quantity is the basis of the quantitative research (Kothari, 2004). Bowling (2002) argues that quantitative research focuses on *"quantities and relationships between attributes; it involves the collection and analysis of highly structured data"* (p. 194). It is a type of research that could be categorised under empirical or statistical studies which strive *"to generalise the results from the sample to the population"* (Newman and Benz, 1998, p.10) through utilising valid and reliable measures, controlling selected independent variables, and randomisation of the sample (Newman and Benz, 1998).

In fact, despite the complexity of social phenomena and its connection with a specific context, some researchers argue that the quantitative research method is the only path to obtain a causal relationship and to claim a generalisation of the results (Masue, Swai, and Anasel, 2013). It is generally believed that individuals can concur on a common reality (Newman and Benz, 1998). Queiros, Faria, and Almeida (2017) claim that although this type of research seems to be inflexible in regard to analysis, ignoring the context of the issues, its theoretical framework is well structured.

In this study, Omani science teachers' reflective practices and their motivation are two social phenomena that are measured by valid and reliable instruments. The study also involved controlling the independent variables (training platforms) and randomization of the sample.

3.1.2.2 Qualitative research

"Qualitative research attempts to deepen our understanding of how things came to be the way they are in our social world" (Hancock, Windridge, and Ockleford, 2007, p.4). It aims at understanding and describing the meaning that participants give regarding a particular social phenomenon (Boeije, 2009). This is through analysing their particular points of view that could lead to revealing the patterns, processes and structural features of their ideas and beliefs about that phenomenon (Flick, von Kardoff, and Steinke, 2004).

Corbin and Strauss (2008) define qualitative research as *"a form of research in which a researcher(s) or designated co- researcher(s) collects and interprets data, making the researcher as much as a part of the research process as the participants and data they provide"* (p.3). Another researcher defines it as *"a form of systematic empirical inquiry into meaning"* (Shank, 2002, p.5). Whearas, Merriam (2009) points out that *"Qualitative*

researchers are interested in understanding the meaning people have constructed, that is, how people make sense of their world and the experiences they have in the world" (p.13).

In fact, researchers still struggle to reach for a common definition for qualitative research (Gibbs, 2008). This is due to the variation in their ways of understanding this concept resulting from the historical backgrounds that shaped it (Flick, 2014). Thus, scholars are not unified regarding this approach of research. There is a permanent controversy about the definition of qualitative research, how and why to use it as a method of research, its analysing ways, and how to present it (Guest, Namey, and Mitchell, 2013). However, it seems that there is an agreement between them about the contributions which could be provided by applying qualitative research. For example, it could give an explanation for the process that leads to establishing an individual behaviour, 'the micro', as a result of the influence of factors or variables, 'the macro' (Barbour, 2013). In addition, it could also answer questions related to our social reality, such as:

· Why an individual chooses to carry out certain behaviour?

· How does an individual form his points of view and stances?

· How do some incidences affect an individual? (Hancock et al., 2007).

Corbin and Strauss (2008) mention that the qualitative research approach helps to reach deeply into the participants' experiences, and illustrates the formation of meanings in its cultural context. Furthermore, Airasian and Gay (2003) point out that this type of research is useful in clarifying an unknown and complex phenomenon, especially in the beginning of the process of understanding the phenomenon. There are various ways and techniques by which the qualitative research could reveal, explain, and help to understand social phenomena, such as analysing people's experiences, interactions, communication and their documents (Gibbs, 2008). Thus, a researcher could gain massive and rich data in the form of description, quotation and narration (Vosloo, 2014).

The current study uses the qualitative method in order to reveal Omani science teachers' points of view on the impact of using specific training platforms (mobile technology with certain activities, workbooks with certain activities, and mobile technology without any activities) on their reflective practices and motivation towards teaching and planning lessons. It also attempts to deepen our understanding of the aspects related to these

two variables. Particularly, why did Omani science teachers have these specific levels of reflective practices and motivation?

Creswell (2014) argues that there is an acceptable agreement among scholars about the essential characteristics of qualitative research. Creswell (2014) and Vosloo (2014, p.328) summarise these characteristics, as follows:

● *Natural setting:* Gathering information from participants during acting in their actual field is a primary characteristic of qualitative research (Creswell, 2014). Researchers of this type of research obtain data through conducting direct contact, or face to face interaction, with participants at their location, where they face the issue that is to be studied. They do not use instruments such as questionnaires to participants to be completed.

● *Researchers rely on themselves in gathering information:* In this type of research, questionnaires or instruments that are prepared by other scholars are not usually used for collecting data. It is the duty of the qualitative researchers themselves to obtain these data by considering participants' critical incidences, analysing documents, and talking face-to-face with participants (interviews) (Creswell 2014).

● *Different forms of data sources:* Researchers in qualitative research provide varieties of forms of data through utilising different methods in order to collect these data, such as interviews, documents, and observations (Creswell 2014).

● *Rely on description:* It is common in this type of research to notice the broad use of words in order to describe a phenomenon (Vosloo, 2014).

● *Individuals' meanings:* qualitative researchers strive to discover the meanings that individuals have about phenomena or issues, and how they make sense of them (Creswell 2014; Vosloo, 2014).

● *Inductive data analysis:* data are analysed inductively; building the unit of information from the specific to the general (Vosloo, 2014; Creswell 2014).

● *Changeable plan:* the research process and plan could be changed after discovering the reality by the researcher. In fact, even the questions, or the participants or sites to be visited could be modified (Creswell 2014).

● *Consideration of the background of the researcher:* It is important to avoid bias resulting from the background of the researcher. Thus, the researcher has to reflect on the impact of their background on their interpretations or descriptions of data (Creswell 2014).

3.1.2.2.1 Interviews

An interview, a common example of qualitative data sources, could be considered as a way to explore the world from the participants' perspectives (Kvale and Brinkmann, 2009). It is an attempt to reveal the meaning they give to their experiences (Kvale and Brinkmann, 2009). It is a social conversation (Vosloo, 2014), *"usually between two people where one person - the interviewer - is seeking responses for a particular purpose from the other person: the interviewee"* (Gillham, 2000, p.1). The interview is described as a professional conversation shaped by cooperation between the researcher and the informants to generate the required information about a topic (Kvale and Brinkmann, 2009).

Interview Structure

Interaction in everyday conversation might be casual and without any purpose. However, this is not the case in the research interview where the main questions are prepared, and have a target (Kvale and Brinkmann, 2009). The interview could be one of three different forms: *"structured interview, semi-structured interview, and unstructured interview"* (Arksey and Knight, 2011, p.7).

1- *Unstructured interview:* in this type of structure, the questions of the interview are not determined in advance. (Hameedsha, 2012). Thus, the researcher has the flexibility to choose the suitable way to reveal the point of view of participants about the main topic area that has been determined previously, before conducting the interview (Arksey and Knight, 2011). Their main roles are to determine the fundamental issues for investigation and to foster the interviewees to be more spontaneous and to talk freely about the themes, without any restrictions (Arksey and Knight, 2011). The unstructured interview may generate rich information about the way the participants view the world, but requires much more effort at the analysis stage (Arksey and Knight, 2011).

2- *Structured interview:* each participant in this type of interview will be asked very similar, if not the exact same questions (Bernard and Ryan, 2010). This is only employed for obtaining standard data about the interviewees (Arksey and Knight, 2011).

3- *Semi-structured interview:* this type of interview is widely used and is considered flexible in terms of the ability of the researcher in modifying the arrangement of the interview's topics structure (Bernard and Ryan, 2010). However, the participants will be asked similar questions (Bernard and Ryan, 2010) which leads to the feasibility of the comparison between the interviewees. The researchers approach in covering each theme is based on utilising an interview protocol which is a series of subjects or questions by which the interviewer is able to ensure that all issues have been covered (Bernard and Ryan, 2010).

The interview structure of the current study

In order to deeply describe and explore participants' perspectives and opinions, this study relies on the semi-structured interview, as it has the necessary flexibility and is semi-controlled in the way of generating the qualitative data for:

a. Confirming quantitative results regarding teachers' reflective practices, and their motivation towards teaching and planning lessons.

b. Clarifying the impact of the study intervention (the impact of using different training platforms on teachers' reflective practices and their motivation towards teaching and planning lessons).

c. Deepening the explanations of the experimental results.

d. Exploring factors that affect the participants' reflective practices and their motivation towards teaching and planning lessons.

3.1.3 Population and sample

The study's population is the 156 in-service science teachers who teach 10th Grade at Al Batinah-North Governorate in Oman. This population was selected because of the following varying reasons:

1- There is not a single study (according to the researcher's knowledge) that has been conducted to focus on exploring science teachers' reflective practices or their motivation.

2- There is 3G coverage across the whole Al Batinah-North Governorate, and smart phones have been widely used in this area for a long time.

3- Using mobile technology will be more beneficial in the area where the distance issue has a negative role in the training and in the developing teachers professionally, and this Governorate is one of the best examples of that in Oman.

4- As a science inspector for more than 14 years at this Governorate, the researcher has observed that some science teachers have a lack in reflective practice and motivation towards teaching.

The study sample was chosen based on a stratified random sampling process, because of the following reasons:

1- This study is attempting to reveal the influence of being part of some of the sub-groups of the population on the study's variables. The study's population was split into twelve sub-groups. Its intention was to reveal the effect of these differences in the sub-groups on the teachers' reflective practices and their motivation.

2- The approximate calculation of population means is often more precise through a stratified sample (Lohr, 2009).

3- It is a way to avoid getting an undesirable sample (Jaeger, 1984). The researcher was keen to utilise a sample that represents the population of the study without ignoring any of its sub-groups. Thus, the study employed a stratified sample.

4- It gives flexibility that is not available in other types of sampling, especially in sampling procedures, as it allows independent selection procedures for each stratum (Jaeger, 1984).

For the purpose of determining the identity of the study's participants, the following stages had been followed:

Stage One: The population was divided into "strata"

A stratified sampling is very important to obtain more precise information related to the factors that may affect science teachers' reflective practices or motivation towards teaching such as: gender (male – female), years of teaching experience (long – medium-short), and school location (rural - urban). These influences are not paid suitable attention in science educational research in Oman (Al-Balushi and Ambusaidi, 2015). Furthermore, there are some signs that may lead to arguing that these influences might have an effect on the variables of the current study. For example, the achievement of female students in Oman, on average, is always better than male students in all types of achievement tests (the Ministry of Education and the World Bank, 2012). On the other hand, it seems that science teachers who live in urban locations are more likely to be more connected with technology than those who live in rural areas, which could be a sign that they might interact differently when using mobile technology applications. In addition, many studies show that teachers' experiences

may have some impact on the effectiveness of their performance (Rice, 2010). Furthermore, the researcher, as a inspector for more than 14 years, believes that these three factors might influence science teachers' teaching behaviours and motivation.

Based on the previous factors, this study included 12 strata. These strata are determined in the following table:

Table 3.2: The Study Strata

Strata	Characteristics of subjects
Stratum 1	Male, long period of experience, rural
Stratum 2	Male, medium period of experience, rural
Stratum 3	Male, short period of experience, rural
Stratum 4	Female, long period of experience, rural
Stratum 5	Female, medium period of experience, rural
Stratum 6	Female, short period of experience, rural
Stratum 7	Male, long period of experience, urban
Stratum 8	Male, medium period of experience, urban
Stratum 9	Male, short period of experience, urban
Stratum 10	Female, long period of experience, urban
Stratum 11	Female, medium period of experience, urban
Stratum 12	Female, short period of experience, urban

Stage Two: Calculating optimum participant numbers in the sample for the study

In order to calculate optimum participant numbers in the sample for the study, the proportional existence of subjects of each stratum in the population (N_i / N) was multiplied with the study's sample size (n), according to the following formula: (Barreiro and Albandoz, 2001)

$$n_i = n \cdot N_i / N$$

Where:

n_i = Number of subjects in the stratum in the study's sample.

n = Total study sample size.

N_i = Number of subjects in the stratum in the population.

N = the population size.

Stage Three: Subjects (n$_i$) were taken randomly from each stratum

This procedure was conducted based on probability-based sampling (Barreiro and Albandoz, 2001; Doherty, 1994). In this technique, every subject in the stratum had a unique number in a stratum's list that contains all members of this stratum. Then, separately, for each stratum, the researcher wrote the number of each subject in the stratum on a small piece of paper, which was then folded and put in a bowl. These folded papers were mixed together, and then the researcher picked the number of papers that represented the size needed from this stratum.

Stage Four: these taken subjects (n$_i$) from each stratum were assigned equally and randomly (based on probability sampling) into three groups, according to the research's design (experimental group, control group1, and control group2).

3.1.4 Sample size

How big is the sample size (N) that is likely to obtain statistical significant results? This question cannot be answered without explaining the following concepts: the power (1-β), type-I error (α) and type-II error (β), effect size (ES), and standard deviation (SD) (Cohen, 1992a; Farrokhyar et al., 2013, p.208; Sathian et al., 2010, p.7).

3.1.4.1 Statistical power

"Statistical power is defined as the probability of rejecting the null hypothesis when it is in fact false and should be rejected" (Mumby, 2002, p.85), or it is the *"ability to detect an effect or an association if one truly exists"* (Farrokhyar et al., 2013, p.208). It is mainly about the probability of obtaining statistically significant data, and is based on three factors – *"the significance criterion (α), the sample size (N), and the population effect size (ES)"* (Cohen, 1992a, p.156). Most researchers in empirical research utilise power analysis, hoping to be able to accept the facts related to the phenomena under investigation after the null hypothesis has been rejected (Cohen, 1992b).

According to Farrokhyar et al. (2013), there are two kinds of possible errors that can take place while examining a null hypothesis: *"type-I error (α) which refers to the probability of rejecting the null hypothesis when it should be accepted"* (p.208), and *"type-II error (β) which refers to the probability of not rejecting the null hypothesis when it should be rejected"* (Farrokhyar et al., 2013, p.208).

Based on McCrum-Gardner (2010), in this study $\alpha = 0.05$, and the size of power is 0.80. This size of power represents the minimum acceptable level and shows the probability of 80 percent for the null hypothesis to be rejected, while rejecting it is true (Cohen, 1992b; McCrum-Gardner, 2010; Woods et al., 2006).

In other words, it indicates that if treatment groups have a true difference between them, then the ability to discover this deference is 8 out of 10 (Evans, Wei, and Spyridakis, 2004; McCrum-Gardner, 2010).

3.1.4.2 Effect size (ES)

Coe (2002) defines Effect size as *"a way of quantifying the size of the difference between two groups"* (p.1). It is a way to measure the effectiveness of a new treatment on an experimental group comparing a control group which does not have that treatment (Cunningham and McCrum-Gardner, 2007).

Identifying a priori sample size of variables is crucial in order to minimize the risk of obtaining an underpowered result (Farrokhyar et al., 2013). Based on the literature reviews, the researcher estimated the effect size for the study's variables (teachers' reflective practices and their motivation). He found that Cohen's d= 0.5, which is a medium effect size, is suitable for estimating or assessing the necessary sample size in this study. (See Chapter Two, section 2.4.7, p.80).

3.1.4.3 Determining sample size

The following formula estimates the necessary sample size (Sathian et al., 2010, p.7; Wittes, 2002, p.42),

$$n = \frac{2\sigma^2 (Z_\beta + Z_{\alpha/2})^2}{\text{difference}^2}$$

Where "*n represents the sample size in each group, σ represents standard deviation of the outcome variable*" (Sathian et al., 2010, p.7), which we assume equals 1, based on the estimations from published data (see Chapter Two), "*z_β represents the desired power (typically 0.842 for 80% power), $z_{\alpha/2}$ represents the desired level of statistical significance (typically 1.96), and the difference which represents the effect size*" (Noordzij et al., 2010; Sathian et al., 2010, p.7), which equals Cohen's d= 0.5.

$$n = \frac{2(1)^2 (0.842 + 1.96)^2}{(0.5)^2} \qquad\qquad n = 62.8 \approx 63$$

This means that the number of subjects in each group has to be 63, so the sample size has to be 63×3= 189, which is more than the population size (156). However, the researcher assumes that a sample size of 75, which is about 48% of the population, will be enough to represent the population of the study, especially if the difficulties in monitoring and recruiting a large number of participants have been taken into consideration. Furthermore, Alreck and Settle (1995) claims that 10% of the population is usually enough to shape a sample of a study (as cited in Hill, 1998).

Thus, the sample size of the current study became 48 × 156 /100 = 74.88 ≈ 75, which means that for each of the three groups of the study, there were 25 subjects. However, the researcher invited 25 extra participants to be involved in order to overcome any unexpected withdrawal of participation. Thus, 100 science teachers were randomly chosen from the population of the study. Then, they had been randomly assigned to each of the following groups: the experimental group, control group1, and control group2.

In order to avoid any undesirable interaction between the different groups, the researcher decided to prevent the existence of two or more participants in the same school, and at the same time belonging to different groups of the study. So, in each school that had a case such as this, the researcher had unified the participants' type of group. This means that in each school there was only one type of group.

On seeking informed consent, nine participants declined to be involved in the intervention part of the study, which lead to 91 participants taking part in this stage. However, the number of participants was reduced to 83, due to various reasons, when starting conducting the intervention of the study at the beginning of semester two of the academic year 2016/2017. The following table (3.3) presents the 12 strata of the study, and the participants' distribution in each of them:

Table 3.3: Participants' distribution in the study strata

Strata	Characteristics of subjects	n
Stratum 1	Male, long period of experience, rural	3
Stratum 2	Male, medium period of experience, rural	8
Stratum 3	Male, short period of experience, rural	3
Stratum 4	Female, long period of experience, rural	4
Stratum 5	Female, medium period of experience, rural	5
Stratum 6	Female, short period of experience, rural	4
Stratum 7	Male, long period of experience, urban	15
Stratum 8	Male, medium period of experience, urban	11
Stratum 9	Male, short period of experience, urban	4
Stratum 10	Female, long period of experience, urban	6
Stratum 11	Female, medium period of experience, urban	11
Stratum 12	Female, short period of experience, urban	9
Total		83

The final distribution of participants in the second stage (the intervention), was as follows:

Table 3.4: Gender * Period of teaching experience * School location * training platform Cross tabulation

Training platform	School location			short	medium	long	Total
				header: Period of teaching experience			
Using mobile	urban	**Gender**	Male	1	4	5	10
			Female	2	4	2	8
		Total		3	8	7	18
	rural	**Gender**	Male	1	3	1	5
			Female	2	2	1	5
		Total		3	5	2	10
	Total	**Gender**	Male	2	7	6	15
			Female	4	6	3	13
		Total		6	13	9	28
Using workbook	urban	**Gender**	Male	1	4	4	9
			Female	3	4	1	8
		Total		4	8	5	17
	rural	**Gender**	Male	1	2	1	4
			Female	1	2	2	5
		Total		2	4	3	9
	Total	**Gender**	Male	2	6	5	13
			Female	4	6	3	13
		Total		6	12	8	26
Using diary cards	urban	**Gender**	Male	2	3	6	11
			Female	4	3	3	10
		Total		6	6	9	21
	rural	**Gender**	Male	1	3	1	5
			Female	1	1	1	3
		Total		2	4	2	8
	Total	**Gender**	Male	3	6	7	16
			Female	5	4	4	13
		Total		8	10	11	29
Total	urban	**Gender**	Male	4	11	15	30
			Female	9	11	6	26
		Total		13	22	21	56
	rural	**Gender**	Male	3	8	3	14
			Female	4	5	4	13
		Total		7	13	7	27
	Total	**Gender**	Male	7	19	18	44
			Female	13	16	10	39
		Total		20	35	28	83

3.1.5 Instruments

3.1.5.1 Teachers' reflective practices instrument

In order to establish an assessment tool for teachers' reflective practices, it is important to determine the levels or components of these reflective practices which can lead to providing a conceptual framework to develop this tool (Larrivee, 2008). However, as a consequence of the different definitions of reflective practices, and the wide range of their meanings, there is no generally accepted definition or determination of reflective practices' various levels (Akbari et al., 2010; Larrivee, 2008). There are different attempts to determine levels of reflection, beginning with Van Manen who suggested three levels - technical rationality, practical reflection, and critical reflection (Akbari et al., 2010; Larrivee, 2008; Van Manen, 1977).

The previous table (2.1) in Chapter Two, section 2.2.4, p.48, shows the extent to which there are differences in the literature reviews about levels of reflection, which led to a significant effect on the way educators assess teachers' reflective practices. A broad review in the literature had been performed by the researcher in order to identify an instrument of teachers' reflective practices which is valid and reliable. In terms of reflective thinking, many studies rely on Kember et al's. (2000) questionnaire, consisting of 16 items and including the following reflective levels: *"Habitual action, understanding, reflection, and critical reflection"* (p.383-385). On the other hand, in terms of teachers' reflective practices, Choy and Oo (2012) prepared a questionnaire consisting of 33 questions with a Likert scale, including the following areas – *"ability to self-assess, awareness of how one learns, developing lifelong learning skills, and influence of belief about self and self-efficacy"* (p.171-173). In contrast, Larrivee (2008) has created a survey for assessing teachers' levels of reflective practice, which includes *"four levels - pre-reflection, surface reflection, pedagogical reflection and critical reflection"* (p.348).

Having reviewed the candidate instruments for the purpose of answering the questions of the current study that relate to the reflective practices variable, the researcher decided to apply the Akbari et al.'s (2010, p.224) instrument. This is because it seems more comprehensive than the other instruments, and is capable of achieving the research objectives. Furthermore, many studies have examined its validity and reliability, such as Yesilbursa (2013). In addition, many researchers in various countries have employed it, such

as Bayat and Molanaie (2016), and Keshavarzi and Fumani (2015). Finally, it may suit the Omani context because it was applied in a neighbouring country.

Teachers' Reflective Practices Instrument Validity and Reliability

Akbari et al. (2010) developed an instrument after reviewing more than 600 categories and behaviours of teachers. This instrument consists of 29 questions with *"a Likert scale ranging from 'always' to 'never'"* (Akbari et al., 2010, p.215), and includes six elements as follows – *"practical element, cognitive element, learner element, meta-cognitive element, critical element and moral element"* (Akbari et al., 2010, p.214). After piloting this instrument on 32 teachers, the Cronbach alpha reliability was equal to 0.91 (Akbari et al., 2010). In order to validate the instrument, Akbari et al. (2010) utilised a sample of 300 teachers, applying exploratory and confirmatory factor analyses. As a consequence, the original total of items in the instrument reduced from 42 to 29 (see Appendix A, p.302).

The following table was taken from Faghihi and Anani Sarab (2016, p.65), and shows the five sections of the Akbari et al. (2010) instrument with their definitions.

Table 3.5: The Akbari et al. (2010) instrument items categorised into five sections

Components	Questions	Definition
Practical	1-6	*Actual act of reflection by using different tools, such as keeping journals, talking to colleagues.*
Cognitive	7-12	*Conscious effort for professional development by attending conferences, and reading professional books and journals.*
Learner	13-15	*Deals with knowledge of learners and their affective/cognitive states.*
Meta- Cognitive	16-22	*Deals with teachers' knowledge of their personality, their definition of learning and teaching, their view of their profession.*
Critical	23-29	*Deals with socio-political dimension of teaching.*

(Faghihi and Anani Sarab, 2016, p.65)

3.1.5.2 Teachers' motivation instrument

In terms of teachers' motivation, this study relies on 'the Work Tasks Motivation Scale for Teachers (WTMST)' instrument, which was primarily evolved by Fernet, Senecal, Guay, Marsh, and Dowson (2008, p.256) (see Appendix B, p.304). This instrument has been used in different studies, such as Gorozidis and Papaioannou (2014), Kim and Cho (2014), and Tekin (2016). It consists of *"five subscales – intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation"* (Fernet et al., 2008, p.274). It aims to measure six tasks – *"class preparation, teaching, evaluation of students, classroom*

management, administrative tasks, and complementary tasks" (Fernet et al., 2008, p.274). Every subscale includes three items, thus, for each task there is a total of 15 items, with a *"Likert scale ranging from 1= Does not correspond at all to 7= Corresponds completely"* (Fernet et al., 2008, p.262). Since the main objectives of the present study is to reveal teachers' motivation towards teaching and planning lessons, the study employed class preparation tasks and teaching tasks only. Hence, there will be a total of 30 items of the instrument (see Appendix B, p.304). The following table reveals the five components of the Work Tasks Motivation Scale for Teachers (WTMST), with their definitions.

Table 3.6: The Work Tasks Motivation Scale for Teachers (WTMST) Instruments items categorised into five components

Components	Definition
Intrinsic Motivation	Implementing a task or an activity for gaining satisfaction derived from engaging in that task or activity itself (Ryan and Deci, 2000)
Identified Regulation	Refers to a clear identification of the importance of implementing a behaviour by the individual (Ryan and Deci, 2000).
Introjected Regulation	Observed when the *"behaviours are performed to avoid guilt or anxiety or to attain ego enhancements such as pride."* (Ryan and Deci, 2000, p.72)
External Regulation	Motivating behaviour by an external need or by getting a reward (Ryan and Deci, 2000).
Amotivation	Amotivation is defined by *"the lack of intention or willingness to engage in physical activity"* (Sweet, Fortier, Strachan, and Blanchard, 2012, p.320)

(Ryan and Deci, 2000, p.72*; Sweet et al., 2012, p.320)*

Teachers' Motivation Scale Validity and Reliability

For the purpose of validating the instrument, to *"measure what it purports to measure"* (Cohen et al., 2011, p.179), Fernet et al. (2008) utilised a sample of 609 teachers during the main study. The instrument also has a satisfactory reliability. The subscales possess the following Cronbach's alpha values: Intrinsic= 0.83-0.96, Identified= 0.72-0.89, Introjected= 0.79-0.89, External= 0.64-0.87 and Amotivation= 0.75-0.81 (Fernet et al., 2008). Thus, by this instrument we have a high chance of obtaining similar results if it was repeated for the same participants within a similar context (Cohen et al., 2011).

Although both instruments (the teachers' reflective practices instrument, and the teachers' motivation towards teaching instrument) have a satisfactory validity and reliability, the researcher has conducted some steps in order to ensure that they both match the Omani context:

1- Translating both instruments from the English language to Arabic, and asking an expert to double check the translation.

2- Showing both instruments to various educational experts in Oman (three senior science inspectors, one of whom has a Ph.D. degree, and one science inspector with a Ph.D. degree) for the purpose of obtaining their feedback about the extent to which it makes sense in the Omani context.

3- Implementing any changes needed to the instruments, according to the experts.

As a result of this process, no changes were made to either instruments, except for translating them from English into Arabic.

3.2 The Methodology (The Process)

Introduction

This section, as mentioned previously, covers the study procedures, the study's questions and its relation to the data sources, data analysis, where it shows, in detail, the quantitative and qualitative analysis, the reliability and validity of the qualitative data, and the ethical considerations.

3.2.1 The study's procedures

The procedures concerning data collection started with obtaining a permission letter from The Department of Education Ethics Committee at the University of York, in order to conduct the pilot study and the main study. A permission letter from the technical office at the Ministry of Education in Oman was then obtained for the same purpose. Meanwhile, the questionnaires of the study were translated to Arabic, and the interviews questions and protocol were prepared. Furthermore, the activities of the pilot study were designed. After that, the researcher started recruiting participants for both the pilot study and the main study. Each participant was given an informed consent letter regarding both the instruments and the interviews. Next, the researcher randomly identified the experimental group and control groups 1 and 2, for the pilot study and also for the main study. The pilot study was conducted and lasted for about one month, during the period 11th September 2016 to 16th October 2016. Meanwhile, the study's population started completing the questionnaires, which were considered as a pre-test for the participants of the main study. As a result of carrying out the pilot study, some changes in the intervention of the study were made, and the final design of

the study's activities was determined. After that, the main study commenced by conducting a meeting with all groups (some of which I met at their school) in order to explain the study's goals, period of time to be undertaken, and their roles and rights. In addition, both the experimental and control group1 received training on how to implement the activities of the study. This step was undertaken by giving the participants an informed consent letter (for some of the extra participants who were invited later, in order to overcome any unexpected withdrawals, and who did not receive the required form of informed consent letter during the recruitment stage). During the third week, the intervention of the study started, and ended at Week 14. During Weeks 14 to 15, the interviews and post-test were conducted for all groups.

The Study Procedures	
Permission	• The Department of Education Ethics Committee at the University of York. • The Technical Office at the Ministry of Education in Oman.
Questionnaires	• Translation from English to Arabic language.
Interviews	• Preparing the interview questions. • Preparing the interview protocol.
Designing	• Designing the activities of the pilot study.
Recruitment	• Starting recruiting participants for the pilot study and main study.
Identifying Groups	• Identifying randomly the experimental group and control groups 1 and 2.
Pilot Study	• Conducting the pilot study.
Questionnaires (Pre-test)	• Asking the whole population of the study to complete the questionnaires (pre- test for main study participants)
Meeting Groups	• Conducting a meeting with all groups. • Training both experimental and control group1.
Intervention	• Some changes in the study intervention.
The Main Study	• Starting the main study.
Post-test/ Post interviews	• The interviews were conducted again (post-interviews) • The participants of the main study complete the questionnaires (post-test).

Figure 3.1: The Study Procedures

3.2.2 The research questions and data collection

The following table shows the research questions and approaches that have been relied upon for data collection:

Table 3.7: Research Questions and Data Collection

The questions	Data sources	The purpose
To what extent do science teachers in The North AL Batinah Region of the Sultanate of Oman: A. Practise reflective teaching? B. Show motivation towards teaching and planning lessons?	Questionnaires, and Interviews	To determine Omani science teachers' levels of reflective practices. To identify Omani science teachers' levels of motivation towards teaching and planning lessons.
What are the key influences associated with Omani science teachers' levels of reflective practices and their motivation towards teaching and planning lessons?	Interviews	To explore the key factors associated with Omani science teachers' levels of reflective practices and their motivation towards teaching and planning lessons.
Is there any significant association between Omani science teachers' reflective practices and their motivation towards: A. Teaching? B. Planning lessons?	Questionnaires	To investigate the association between Omani science teachers' reflective practices and their motivation towards teaching and planning lessons.

What is the impact of using mobile technology as a training platform on Omani science teachers':
A. Reflective practices?
B. Motivation towards:
   a. Teaching?
   b. Planning lessons?
	Questionnaires, Interviews, and Documents Analysis.	To examine the effect of utilising mobile apps (Facebook and Twitter) compared to no use of mobile apps as a training platform on Omani science teachers':
		  A. Reflective practices.
		  B. Motivation towards:
		    a. Teaching.
		    b. Planning lessons.

3.2.3 Data analysis

Introduction

One of the main objectives of the present study is to investigate the extent to which Omani science teachers are reflective and motivated towards teaching and planning lessons. For this purpose, the study's population was invited to respond on the instruments relating to their reflective practices and their motivation towards teaching and planning lessons (pre-test), on the second week of the first school semester of the year 2016/2017. The collected data were analysed through a descriptive statistics approach that was provided by the Statistical Package for Social Science (IBM SPSS Statistics Software Version 24). The second main objective is to examine the impact of using mobile technology on Omani in-service science teachers' reflective practices, and their motivation towards teaching and

planning lessons. For that purpose, the participants of the main study responded on the same previously used instruments (post-test), after finishing implementing an intervention. Then, IBM SPSS Statistics Software Version 24 was utilised again for the purpose of analysing the quantitative data of the study, using two different approaches - descriptive statistics and statistical inference. For the purpose of comparing the results between the two conditions - pre and post performances, a parametric test; two-way repeated measures analysis of variance; two-way ANOVA test (see, Howitt and Cramer, 2014, p.224), and non-parametric test; Friedman test (see, Derrac, Garcia, Molina, and Herrera, 2011, p.8), were chosen. For gaining deep-rooted information regarding teachers' reflective practices and motivation, interviews were conducted and then analysed based on thematic analysis. For the same purpose, the main study participants' documents (activities) were also analysed. Furthermore, the association between the reflective practices of Omani science teachers, and their motivation towards teaching and planning lessons were revealed by utilising a Spearman Test. Therefore, this section covers the following - quantitative analysis, qualitative analysis, and document analysis.

3.2.3.1 Quantitative analysis

This study relied on three assessment instruments to measure its dependent variables (i.e. science teachers' reflective practices, science teachers' motivation towards teaching, and science teachers' motivation towards planning lessons). These instruments were applied within two different periods of time:

- *The first semester of the academic year 2016/2017 (pre-test)*

All members of the population (156 science teachers) were invited to respond on these instruments throughout the second week of the first school semester of the year 2016/2017. Only six of them did not participate in answering the instruments questions. More than 62% of the participants had teaching experience of 10 years and less, while the minimum years of experience was 1 (5.3%), and the maximum years of experience was 27 (2%), as shown in Table (3.8) and Figure (3.2). Therefore, it seems that it is suitable to classify their years of experience in teaching into three categories:

- Years of experience (5 and less) = short experience
- Years of experience (6 - 10) = medium experience
- Years of experience (11 and above) = long experience

(Ambusaidi and Al-Rashdi, 2012; Bani Khalaf, 2008)

Table 3.8: Years of Experience

	Years	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	8	5.2	5.3	5.3
	2.00	0	0.0	0.0	0.0
	3.00	4	2.6	2.7	8.0
	4.00	5	3.2	3.3	11.3
	5.00	15	9.7	10.0	21.3
	6.00	9	5.8	6.0	27.3
	7.00	1	0.6	0.7	28.0
	8.00	10	6.5	6.7	34.7
	9.00	14	9.0	9.3	44.0
	10.00	27	17.4	18.0	62.0
	11.00	8	5.2	5.3	67.3
	12.00	4	2.6	2.7	70.0
	13.00	7	4.5	4.7	74.7
	14.00	7	4.5	4.7	79.3
	15.00	10	6.5	6.7	86.0
	16.00	2	1.3	1.3	87.3
	17.00	13	8.4	8.7	96.0
	18.00	0	0.0	0.0	0.0
	19.00	2	1.3	1.3	97.3
	25.00	1	0.6	0.7	98.0
	27.00	3	1.9	2.0	100.0
	Total	150	96.8	100.0	
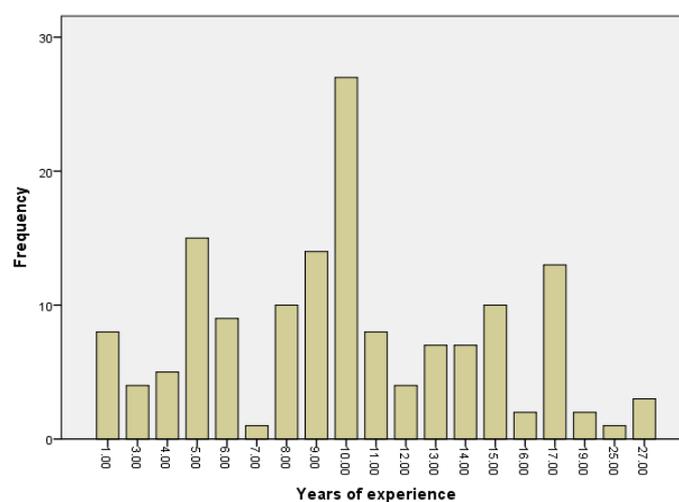
Figure 3.2: Years of Experience -vs- Frequency

Thus, a total number of 150 participants of 10th Grade Omani in-service science teachers filled the instruments of science teachers' reflective practices and their motivation

towards teaching and planning lessons. The majority of them (41.3 %) have medium years of experience, while (38%) of them have long years of experience. The last category (short years of experience) is represented by (20.7 %) participants.
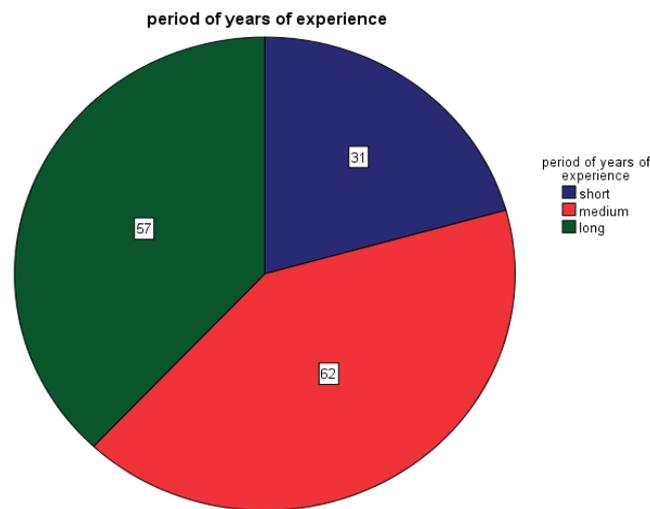
Figure 3.3: Period of Years of Experience (Categories) –vs- Frequency

The following table summarises their characteristics:

Table 3.9: Period of Years of Experience * School Location * Gender Cross tabulation

| Gender | | | School location | | |
			Urban	Rural	Total
Male	**period of years of experience**	Short	4	5	9
		Medium	17	11	28
		Long	29	6	35
	Total		50	22	72
Female	**period of years of experience**	Short	14	8	22
		Medium	27	7	34
		Long	18	4	22
	Total		59	19	78
Total	**period of years of experience**	Short	18	13	31
		Medium	44	18	62
		Long	47	10	57
	Total		109	41	150

- *The second semester of the academic year 2016/2017 (post-test)*

After finishing implementing the intervention, which lasted until the end of the second school semester (May 2017) of the year 2016/2017, the participants' reflective practices and

motivation towards teaching and planning lessons were measured again using the same previous instruments (post-test).

In this study, the Statistical Package for Social Science (IBM SPSS Statistics Software Version 24) was utilised in order to analyse the quantitative data of the study. Two different approaches were used in order to answer its questions - descriptive statistics and statistical inference.

Descriptive Statistics Technique

The descriptive statistics technique was used for describing participants' performance on the instruments that assessed their reflective practices and motivation towards teaching and planning lessons (pre-test and post-test). As mentioned previously, a total of 150 participants of 10th Grade Omani science teachers responded on those instruments. The data provided by the instruments were organised by giving a unique identification number for each respondent from 1 to 150, bearing in mind the importance of determining the respondents of the experimental and both control groups (pre-test). Following this, the SPSS programme was used in order to analyse the data, where every statement of the scales was coded and their answers were given a score of 5-1 or 7-1, corresponding between "Strongly agree" to "Strongly disagree". This process ended with tables of frequencies that show the extent to which the variables (reflective practices and motivation) are prevalent in the population.

Statistical Inferential Technique

The Omani science teacher participants who represent the experimental and both control groups were asked to respond on the instruments again at the end of the second school semester of the year 2016/2017 (post-test) after conducting the intervention. Then, both pre-test and post-test data for all three groups were utilised by the SPSS programme, in order to compare their results using a statistical inferential technique by applying both parametric and non-parametric methods. The parametric methods are used when the data of the population can be considered as normally distributed, whereas, the non-parametric method does not rely on any assumptions about the data distribution (Cohen, et al., 2011; Mircioiu and Atkinson, 2017). When stating that data is normally distributed, then these data follow *"a bell-shaped curve that is symmetrical"* (Adamson and Prion, 2014, p.333), as illustrated in the next graph.

Figure 3.4: Bell-Curve (http://study.com/academy/lesson/normal-distribution-of-data-examples-definition-characteristics.html)
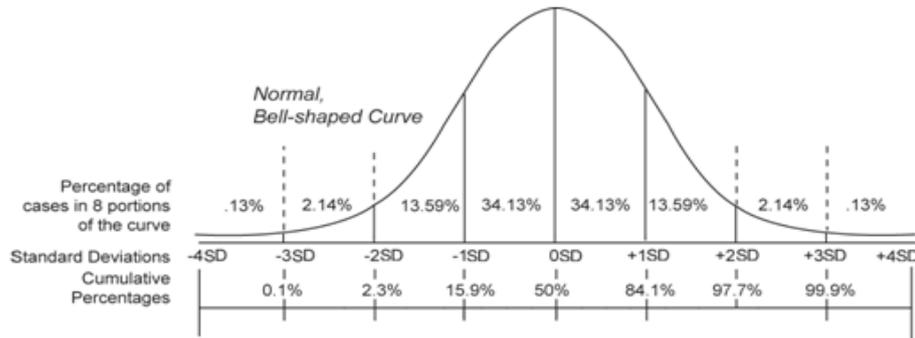
De Vaus (2002) argues that it is appropriate to suppose this shape for the data if a sample size is large enough (N >100). However, *"the notion of normal distribution is only applied to interval-level variables"* (de Vaus, 2002, p.75) whereas, the data of the dependent variables of this study that are ordinal refer to a quantitative data that are *"generated when observations are placed into ordered categories. This type of data is assessment of subjective data of something that cannot be measured"* (Jakobsson, 2004, p.437).

It is always suggested that with ordinal and nominal data, nonparametric tests are utilised, whereas, with ratio and interval data, parametric tests are the right choice (Cohen, et al., 2011; Mircioiu and Atkinson, 2017). The ranked responses of participants on a scale of 1 to 5 is a good example of ordinal data, which is widely used in survey research, and referred to as a Likert scale (Nestor and Schutt, 2012).

However, there is still an argument amongst scholars about whether these data provided by a Likert scale survey should be considered as parametric or non-parametric data (de Winter and Dodou, 2012). On the one hand, some scholars think that researchers could obtain meaningless results if they do not understand the nature of it as ordinal and nominal data, which means that a parametric method is not suitable for testing such data (Awang, Afthanorhan and Mamat, 2016). However, some studies, such as de Winter and Dodou (2012), concluded that *"for five-point Likert items, with the t test and Mann Witney test generally have similar power, and researchers do not have to worry about finding a difference whilst there is none in the population"* (p.1).

Thus, since the data of this study were provided through a Likert scale survey, the researcher decided to respect both of the different points of view, by applying parametric methods if the normality test showed that data are normally distributed, and by applying non-parametric methods if the data are not normally distributed.

In fact, the researcher found that after conducting the normality test for the pre-test data provided by the instruments that assessed science teachers' reflective practices variable that data are normally distributed. Therefore, the decision to apply parametric tests for analysing these data was made. A two-way repeated measures analysis of variance (two-way ANOVA) test was chosen in order to examine the extent to which the interaction between the independent variable, or between-subjects factor (condition: mobile applications, workbooks and diary cards), and the within-subject factor (time: pre-test and post-test), may influence scores on the dependent variable (teachers' reflective practices) (Dimitrov and Rumrill, 2003; Howitt and Cramer, 2014).

However, the normal distribution was not available in the data provided by the instruments that assessed science teachers' motivation towards teaching and planning lesson variables. Thus, a non-parametric test known as a Friedman Test was utilised for the purpose of comparing the results between the two conditions - pre and post-performances.

Furthermore, the study examined the association between science teachers' reflective practices, and their motivation towards teaching and planning lessons by utilising a Spearman Test, which is a non-parametric test. This action was implemented because the Pearson test assumptions (type of parametric test) were violated, as both dependant variables (science teachers' reflective practices and their motivation towards teaching and planning lessons) have ordinal data, and the data of motivation towards teaching and planning lessons variables were not normally distributed.

3.2.3.2 Qualitative analysis

Interview procedure

In order to conduct the interviews successfully, the researcher followed the main procedures as summarised in Creswell and Poth (2017, p.165).

1- Determining the research questions

The conducted interviews could be described as formal interviews that cover three main fields: the extent to which Omani in-service science teachers are reflective and motivated, the influences that affect teachers' reflective practices and their motivation, and the impact of the interventions on their reflective practices and motivations towards teaching and planning lessons. In fact, the researcher precisely formed the questions, which could be considered as sub-questions of the research questions, according to the following topics:

a.   Defining teachers' reflective practices

b. The extent to which a teacher believes that they are a reflective teacher.

c. The key factors related to the reflective practices.

d. The importance of reflective practices.

e. Impact of the intervention (mobile applications, workbooks and diary cards) on level of reflective practices.

f. The extent to which a teacher believes that they are a motivated teacher.

g. The key factors to enhance teachers' motivation towards teaching and planning lessons.

h. Impact of the intervention (mobile applications, workbooks, and diary cards) on teachers' motivation towards teaching and planning lessons.

2- *Designing and using an interview protocol*

During the implementation of the semi-structured interviews, the researcher was interested in asking questions without any order restrictions. He tried occasionally to change the approach of asking these questions in order to be clearer for the informants. From time to time, he added more questions for the purpose of obtaining further information about the topic or the concept. The following sample shows an interview protocol example of the experimental group which oriented the interview procedures

Table 3.10: Interview Protocol Project

Time of interview:
Date:
Place:
Interviewee:
Interview Questions:

A. *Experimental group.*

1- What does reflective teacher mean? If they do not have a definition, then why?
2- Do you consider yourself as a reflective teacher?
   If Yes, give me examples to support this claim.
   If No, then why?
   To what extent out of 10?
3- Is it important to be a "Reflective Teacher"? Tell me more about that.
4- Explain the impact of the professional development programme using mobile applications on your reflective practices? (For post-interview only). Always ask for examples.
5- What are the key factors that affect your reflective practices?
6- Do you consider yourself as a motivated science teacher? Tell me more about that.
   To what extent out of 10?
7- Explain the impact of the professional development programme using mobile applications on your motivation towards teaching? (For post-interview only). Always ask for examples.
8- What are the key factors that:
   a. Increase your motivation towards teaching?
   b. Reduce your motivation towards teaching?
   c. Have you thought about that before? Why?

3- *Identifying the interviewees (the interview's participants)*

The researcher randomly chose 21 participants to be interviewed. 10 participants were from the experimental group, and 5 participants were from each of the other groups - control group1 and control group2. The table (3.11) summarises their details.

Table 3.11: Gender * Years of experience * Group * School location * Cross tabulation of interview participants

				Years of experience			
Group	**School location**	**short**	**medium**	**long**	**Total**		
using mobile	Urban	**Gender**	Male	0	2	1	3
			Female	3	1	0	4
			Total	3	3	1	7
using workbook		**Gender**	Male	0	3	-	3
			Female	2	0	-	2
			Total	2	3	-	5
using diary cards		**Gender**	Male	0	-	2	2
			Female	1	-	0	1
			Total	1	-	2	3
Total		**Gender**	Male	0	5	3	8
			Female	6	1	0	7
			Total	6	6	3	15
using mobile	Rural	**Gender**	Male	0	1	1	2
			Female	1	0	0	1
			Total	1	1	1	3
using workbook		**Gender**	Male	-	1	-	1
			Total	-	1	-	1
using diary cards		**Gender**	Female	1	-	1	2
			Total	1	-	1	2
Total		**Gender**	Male	0	2	1	3
			Female	2	0	1	3
			Total	2	2	2	6
using mobile	Total	**Gender**	Male	0	3	2	5
			Female	4	1	0	5
			Total	4	4	2	10
using workbook		**Gender**	Male	0	4	-	4
			Female	2	0	-	2
			Total	2	4	-	6
using diary cards		**Gender**	Male	0	-	2	2
			Female	2	-	1	3
			Total	2	-	3	5
Total		**Gender**	Male	0	7	4	11
			Female	8	1	1	10
			Total	**8**	**8**	**5**	**21**

4- Obtaining consent from the interviewee to participate

This step was undertaken during the first school semester of the year 2016/2017, and the researcher provided his email address and contact number to each participant for any future inquiries.

5- Collecting data using adequate recording procedures

The researcher used a good quality audio taping device with sensitive microphones. However, some of the participants, especially the females, were uncomfortable with their interviews being recorded. Therefore, the researcher wrote out all their responses in a notebook, and at the end of the interview, asked the informants to read the responses in order to confirm them.

Interview analysis

The researcher conducted the interviews twice for each participant, as in the table (3.10). The first one was before starting the intervention in the first and second week of the second school semester of the year 2016/2017 (pre-interview), and the other was conducted after completing the intervention in weeks 14 to 15 of the same semester (May 2016).

The data from these interviews were analysed, based on a thematic analysis which is a method of analysis developed by Braun and Clarke (2006). They consider it as *"a method for identifying, analysing, and reporting patterns (themes) within data. It minimally organizes and describes your data set in (rich) detail"* (Braun and Clarke, 2006, p.79). According to them, it is used broadly and many analysis types, such as ground theory analysis and content analysis, are originally thematic. In addition, they assert that using this type of analysis could lead to obtaining a rich, complicated and comprehensive data (Braun and Clarke, 2006). This is because of its flexibility which is not available in all analysis types, and also due to its ability to describe patterns among data without being restricted by theory (Braun and Clarke, 2006). Add to all this, Braun and Clarke (2006) claim that it is important to consider this method of analysis as a basic method for analysing data qualitatively. Furthermore, since the research in Oman is generally limited (Al-Balushi and Ambusaidi, 2015), especially in terms of the teacher motivation topic (Al Rasbi, 2013), the inductive approach might be the best approach to apply, and it could be implemented through this type of analysis.

In conclusion, this type of analysis is considered flexible, a basic method for qualitative analysis, widely used, and able to capture patterns in data without being restricted

by a theory (Braun and Clarke, 2006). Therefore, the researcher is of the opinion that the advantages of this method of analysis might be beneficial and linked to the aim behind the analysis of the interview data. Thus, he decided to apply it as a method to analyse the data.

The natural context to begin the process of qualitative data analysis is through organising these data (Flick, 2014). Most of the interviews were not recorded due to the reasons explained previously, but the researcher relied on verbatim notes from a notebook which were later confirmed by the informants before ending the interview. The voice recordings and agreed verbatim notes from interviews were then transcribed and saved into electronic files, and were pseudonymised before analysis using computer assisted qualitative data analysis software (CAQDAS) (see, Baugh, Hallcom, and Harris, 2010, p.69).

Computer Assisted Qualitative Data Analysis Software (CAQDAS)

Assistance programmes for qualitative data analysis are important to be used in order to provide rigor to the qualitative data (Alyahmadi and Alabri, 2013). They are useful in keeping, managing, and retrieving various types of qualitative data (Creswell and Poth, 2017). It is needless to say that qualitative analysis software does not do the hard work; the analysis can only occur if this software were able to know the meaning of the text, and this not possible as yet (Gibbs, 2002). The researcher utilised the Nvivo11 programme in order to analyse the interviews.

Steps of Analysis

First, the interview's electronic files were imported into the Nvivo software. Then, the researcher (during utilising Nvivo), followed the phases as stated by Braun and Clarke (2006), who developed this technique:

1- Reading the transcripts data in order to be familiar with them.

2- Creating introductory codes and gathering information in a way that links each piece of information to the code that represents it.

3- Forming themes by connecting each code to its relevant node. The term theme points to the format of pattern in the meanings that data contains (Braun and Clarke, 2006).
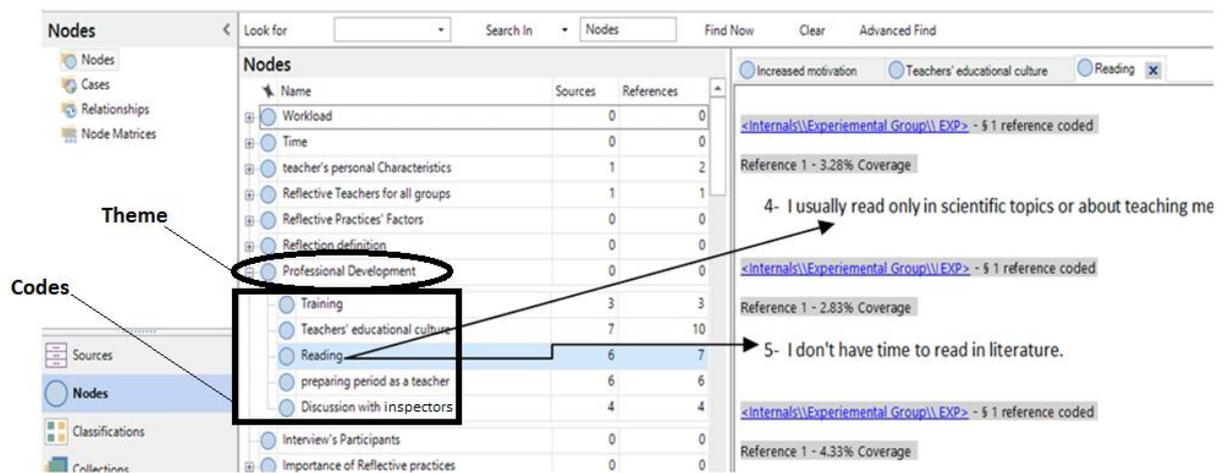
Figure 3.5: Screenshot of generating initial themes

4- Testing themes, whether they are homogeneous (having coherent patterns) and could fit together (with other themes) to form a meaningful thematic map. For example, the theme (professional development) as seen above in the screenshot has five codes: training, teachers' educational cultures, reading, preparation period as a teacher, and discussion with inspectors. The researcher first reviewed those codes in terms of their relation to the theme meaning, and their contribution to teachers' professional development. He then decided that they could all fit together to form the theme of professional development.

5- Giving meaning to the suggested themes in order to understand the point view that each theme refers to.

3.2.3.3 Document analysis

Introduction

Document analysis is a method of collecting qualitative data, and is a part of a more comprehensive term known as 'ethnographic methods' (Kawulich, 2005). Getting the results of this research partly relies on analysing the activities which were carried out by the Omani in-service science teachers (experimental group) who utilised mobile applications, and on analysing the activities which were carried out by the in-service science teachers, who utilised workbooks (control group1). Note that the third group of participants (control group2) had no specific programme. Thus, it is not reasonable to include them in this comparison.

Activities Analysis

A. Reflective Practices

The analysis of teachers' reflective practices in the activities was based only on their engagement in the activities. In fact, a high level of engagement in activities about reflective practices might indicate a higher level of actual reflection. This engagement was estimated according to the following criteria: percentage of answering the questions *(P)*, adding extra answers *(Ex)*, answering open questions *(O-q),* and the answers of the open questions are related to the attached articles and videos *(R)*.

Each of the questions in these activities is only representing a step of the reflective practice model, or a step of the expectancy-value motivation model. However, it is not important, from the view of analysis, to focus on whether the participants' answers are true or false, but more importantly to look at them as a step of the model which has been implemented. Thus, in most of the questions, multiple choice answers were included, but some of these questions were open questions *(O-q)*. This is for the purpose of distinguishing between the participants in some aspects, such as the extent to which they engage in the activities. In the case of Facebook's activities, and their counterpart in the workbook's activities, the questions from (q_1- q_6) represent the Gibb's cycle for reflective practices. Two of them (q_5 and q_6) are open questions.

Answering these open questions *(O-q)* may lead to thinking that the participant has read the articles, or has seen the videos that are attached via the activity. This also might be seen as a sign of better engagement in the activity than those who did not answer these questions, especially if the answers are related *(R)* to those articles and videos.

In addition, the percentage (%) of answering the activities questions *(P)* could help to compare participants' engagement. For instance, participants who answered five questions in an activity are better in their engagement with that the activity than those who answered only two questions.

Furthermore, if a participant adds extra answers *(Ex)* to the provided multiple choices answers, then this could lead to the belief that they were trying to think beyond the frame that was drawn up by the provided multiple choices answers, which also may mean better engagement in the activity than those who did not have different or extended opinions about the discussed topic. In the case of the activities of the Twitter application and their

counterpart in the workbook's activities, there are no open questions, and therefore the engagement's comparison between the two groups will rely only on two criteria: the percentage of participants' answers of the activities *(P),* and adding extra answers to the multiple choices answers *(Ex).*

Thus, the engagement of the participants in the activities was assessed based on four aspects:

1- To what percentage (%) did the participant answer the questions *(P)*?
2- To what extent did the participant add extra answers *(Ex)* to the provided multiple choices answers?
3- To what extent did the participant answer the open questions *(O-q)*?
4- To what extent are the answers to the open questions related to the attached articles and videos *(R)*?

The Engagement

This concept may help to explore any progress in the participants' reflective practices. This suggestion is based on the assumption that if someone is more engaged in a reflective practice activity then their progress in that practice might be much better than those who have engaged less.

The participants' estimations of engagement in the activities, and their counterpart in the workbook' activities, relied on the four factors mentioned previously. The researcher gave each factor a specific mark based on his opinion on the importance of each of them. The total mark for each participant in each activity is 100, and they were divided according to the following table.

Table 3.12: Estimation of Participant Engagement in an Activity

n	The criteria	The Mark
1	The percentage (%) of participants' answers of the activities (P)	50
2	Adding extra answers to the multiple-choice answers (Ex)	13
3	Answering the activities' open questions (O-q)	25
4	The relation of the open questions answers to the attached article and videos (R).	12
Total		100

1- *The percentage (%) of participants' answers of the activities (P):*

Answering all activity questions is a positive sign of engagement, therefore, the researcher awarded 50 marks for this factor. This was done through applying this equation: (number of answers for the activity's questions / number of questions of the activity x 100%), then dividing the result by 2. If the percentage is 100, then the participant will get 100/2 = 50.

2- *Adding extra answers to the multiple choices answers (Ex):*

The existence of extra answers in an activity means that the participant has thought beyond the given framework, which may refer to the critical reflection. The researcher gave 13 marks to a participant if they added one or more extra answers *(Ex)* to the existing multiple-choice answers.

3- *Answering the activities' open questions (O-q): question5 and question6 - related to the Gibb's Cycle for both groups: experimental and control group1:*

> *Question 5:* After reading this article, what are the new strategies (if any exist) that you may follow in order to take care of.......?
>
> *Question 6*: What are your best strategies or your action plan in order to take care of ...... for next lesson?

The researcher gave 25 as a mark for participants who answered both open questions *(O-q)*. The reason behind this is that answering open questions may refer to the occurrence of a significant step in the process of reflective practice. A participant receives 12 marks if they answered only one of these open questions. This is the case even if the answers are not true or do not rely on the attached articles and videos.

4- *The relation of the open question answers to the attached article and videos (R)*

In terms of evaluating the extent to which the answers of the open questions are related to the activities attached article and videos *(R)*, the researcher awarded participants 12 marks if they provided answers that related *(R)* to the topic presented in the attached article and videos. Thus, the total of marks of all these factors are (100) and through this, we may reveal the extent to which a participant was engaged in an activity, and gain an estimation for their changes regarding their reflective practices.

B. Motivation

It seems that it is much easier to explore the improvement in the motivation for the participants who have used any type of platforms (Facebook, Twitter and Workbook) in both

groups. This is through analysing participants' estimations on the two main parts of the expectancy-value theory (expectancy and task value) which are represented by questions A, B, C in the activities.

1- Expectancy

In order to explore changes in the teachers' motivation as a consequence of implementing the activities, the researcher first calculated the difference in their expectancy ($Q_{B \text{ (Expectancy beliefs)}} - Q_{A \text{ (Ability beliefs)}}$) as shown in the example of an activity below. This helps to measure the progress in expectancy; the first part in the adopted motivational model (expectancy-value theory). We can also refer to Q_A as a pre-question about participants' expectancy beliefs regarding their ability to carry out the activity before implementing it, and Q_B as a post-question about the same matter after implementing the activity. These two questions exist in all activities. Then, the comparison between the two groups (experimental group and control group1) in their expectancy was carried out using the IBM SPSS Statistics Software Version 24.

Figure 3.6: Example of an Activity

Figure 3.7: First Main Part of Expectancy-Value Theory

Calculating differences in expectations ($Q_B - Q_A$)

As mentioned previously, this equals *(Mark of answer of question B – Mark of answer of question A).* After receiving this difference in both groups (experimental and control group1) the comparison between these groups was carried out using the Mann Whitney U Test (see, Nachar, 2008, p.14) in the Statistical Package for Social Science (IBM SPSS Statistics Software Version 24).

2- **Task Value**

The researcher then calculated participants' Task Values, which is the second major part in the expectancy-value theory, and is represented by question (C) in the previous example of an activity. This part also exists in all activities.
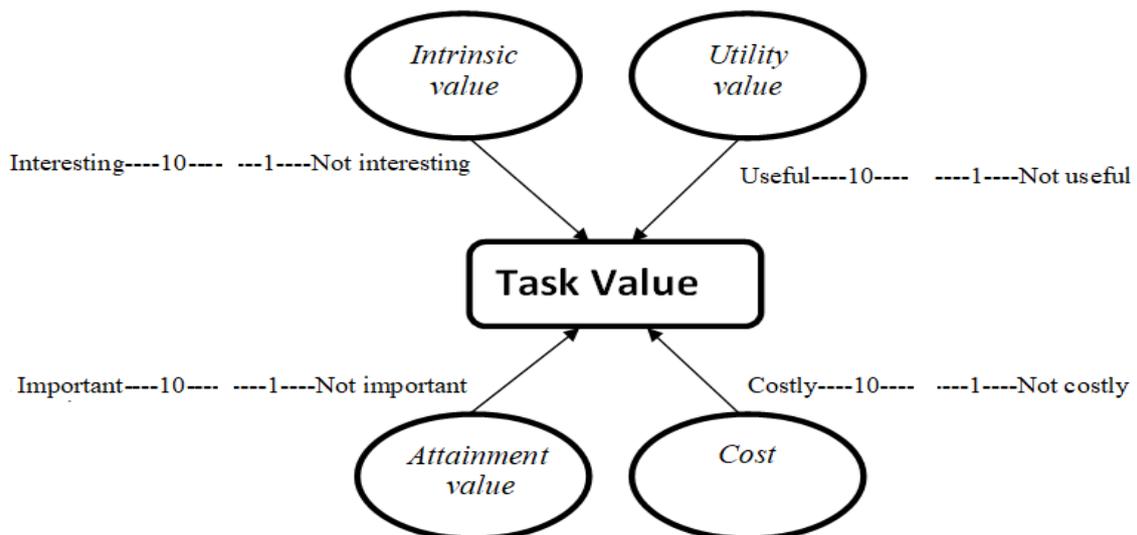
Figure 3.8: Second Main Part of Expectancy-Value Theory

The participants' evaluations of the values of the activities

The activities show the evaluation of the participants of the value of these activities from their perspective, which is correlated to the second main part of the expectancy-value theory. Analysing the last question (Q_C) helps to measure the second part of the adopted motivational model. After receiving the evaluation of the participants for the values of activities in both groups (experimental and control group1) the comparison between these groups is carried out by using the Mann Whitney U Test in the Statistical Package for Social Science (IBM SPSS Statistics Software Version 24).

I have not seen this approach in any other studies. However, it seems that the combination of the calculation of the changes in participants' expectancy in carrying out an activity or implementing a skill, and their estimations of the Task Values (activities values), may show if there are any improvements in participants' motivation as a result of carrying out the activities. Thus, I have employed this approach.

In conclusion, for the purposes of estimating the participants' progress in their reflective practices and their motivation, the activities of both groups (experimental group and control group1) have been analysed based on the three criteria: engagement, difference in expectations *($Q_B - Q_A$),* and participants' evaluation for the values of activities.

3.2.4 Reliability and validity of the qualitative data

It is through reliability and validity that researchers can evaluate the quality of the measurement process that is used to collect the research data. Cohen et al. (2011) claim that it is impossible to avoid the threat to reliability and validity entirely, though, the researcher has attempted to obtain an acceptable degree of reliability and validity for this research finding.

Reliability, or consistency of the research, refers to obtaining similar results if the test or the measurement was repeated with the same participants within a similar context (Cohen et al., 2011). For the purpose of ensuring the reliability of correcting and marking the questions of the activities, the researcher asked a Ph.D. colleague to assess all participants' answers in the first activity, and four samples of the rest of the activities. The percentage of the agreement is 100 per cent in the following factors - answering the activities' open questions *(O.q)* and adding extra options to the multiple choices answers *(Ex)*, and 92 per cent in the case of the percentage of participants' answers of the activities *(P)*, and 87 per cent in the case of the extent to which the answers of the open questions are related to the

activities' attached article and videos *(R)*. For the purpose of increasing the interview reliability, the researcher trained for interviewing during the piloting stage (Flick, 2014). He conducted six interviews with six different informants (three male and three female) who taught 9th Grade students during that stage. He also continued to check the interview's guide until he felt that the questions were sufficient to achieve the goal of conducting interviews (Flick, 2014). On other hand, the researcher ensured the coding reliability by undertaking the coding process twice during a separated period of time of almost three weeks, and then compared the differences between them (intra-rater reliability) which were only a few (Kubanyiova, 2007).

In contrast, validity refers to *"a particular instrument in fact measuring what it purports to measure"* (Cohen et al., 2011, p.179). In order to attain the validity for the research findings, two strategies were applied. The first one used more than one way to collect data, such as triangulation (Cohen et al., 2011; Creswell and Poth, 2017). This research utilises a mixed method approach through implementing three different methods for collecting data, which in this case are questionnaires, interviews, and document analysis. Thus, the results of the qualitative data are supported and confirmed by the quantitative results. The other strategy applies a peer review for the methods of collecting qualitative data where two educational experts in Oman (with Ph.D. degrees) as well as selected inspectors, reviewed the activities and the interview questions in order to give their opinions on whether these activities or questions may help and lead to answer the research questions (Creswell and Poth, 2017). Finally, I also used validated instruments (see the current Chapter, p.97-99).

3.2.5 Ethical considerations

The researcher was aware of the significance of overcoming any ethical concerns that may occur during the different stages of the research. *"Research, wherever it takes place, must be conducted according to the highest standards of rigour and integrity"* (Universities UK, 2012, p.11). The notion of integrity is based on the following aspects - honesty, which is a principle that has to prevail throughout all stages of the research; rigour, in applying the steps of the research, transparency, open-communication, and care with respect for all participants (Universities UK, 2012). Thus, this study has adopted these principles during its different stages, and has avoided any forms of misconduct. Besides, the study was conducted under a framework that respects all legislations and professional standards (Universities UK,

2012). In more detail, the research sequence leads to accepting and adopting the following ethical considerations that were discussed in Cohen, Manion, and Morrison (2007):

1- **Access and acceptance:** obviously, the primary ethical step is to gain permission to perform the study from the authorities, which, is in this case, was the technical office at the Ministry of Education (Al-Lamki, 2009). The researcher sent a formal request to this office clearly describing the purposes of the research, its benefits, and how it will be implemented. The request also included a promise to ensure confidentiality for all participants.

2- **Informed consent:** It is needless to mention the significance of the informed consent letter. *"Informed consent is a question of basic human rights; it is intended to safeguard participants from any mental or physical harm that might befall them as a result of their participation"* (Hesse-Biber and Leavy, 2011, p.64). This letter gives the participants sufficient information about the research (Banister, 2007), and points out the following aspects:

a. The aim of the research (Oates, Kwiatkowski and Coulthard, 2010).

b. The specific nature of the study (Cohen et al., 2011) and the type of contribution they are expected to provide (their role) (Hesse-Biber and Leavy, 2011).

c. It is completely voluntary to join the research project (Cohen et al., 2011).

d. The way that the data is collected and for what purpose it will be used (Hesse-Biber and Leavy, 2011).

e. Participants can freely withdraw in any moment of the research's stages (Banister, 2007).

f. Personal participant information will remain confidential during, and after the end, of the project (Hesse-Biber and Leavy, 2011).

g. The expected time of their engagement with the study (Oates et al., 2010).

3- **Anonymity:** Cohen et al. (2011) claimed that the core of the notion of anonymity is to avoid revealing the identity of any participant through the information provided. Thus, it is clear by adopting this principle that any data collected from the participants will not, under any circumstances, refer to them. Their identities have been linked to the collected data through a coding system, and their details removed from the research data during the analysis stage. Furthermore, the data was protected by using passwords.

4- **Confidentiality:** This study has focused on particular variables that seem to be sensitive in the field of education, such as teachers' motivation and their professional development. Therefore, some participants might give bias responses if they believe that these responses will affect them negatively (Al-Lamki, 2009). It was, therefore, very important to guarantee that the responses of any individual on any activities or questionnaires (even if the researcher could determine who has provided that information) will not harm or compromise them, and will only be used for purpose of this research.

5- **Privacy:** it is the right of all of the study's participants to decide on when and what type of private information they agree to be published or, on the other hand, to not publish (Cohen et al., 2011). It was, therefore, acceptable for any one of them to refuse to respond or engage in any of the research's activities that they felt may reveal any sensitive information.

6- **Deception**: Before the beginning of the intervention, the participants were aware of the true objectives and conditions of the research. There was no possibility to put them in any unexpected situations that they did not agree with. They clearly understood what was happening at all stages of the research (Cohen et al., 2011).

Chapter Four: The Development of the Study Intervention

Introduction

The development of the study passed through different stages. This chapter describes the path of the study intervention development. It also shows, in detail, the procedures and the activities of both the pilot study and the main study. Furthermore, it explains and justifies the way of designing the activities.

4.1 The Development Stages

One of the major purposes of this study is to enhance Omani teachers' reflective practices and their motivation towards teaching and planning lessons. Thus, the beginning of the study started with searching for suitable theoretical frameworks and models that may support our attempt to attain that goal. These theoretical models guided the designing of the study activities. Two models of teachers' reflective practices (Kolb's Cycle and Gibb's Cycle) and one theory of motivation (expectancy-value theory) were chosen and drafts of seven suggested activities were designed according to them. The researcher then focused on selecting various mobile applications capable of hosting the activities of the experimental group. The selection criteria were based on the following aspects:

- The ease of utilising these applications.
- Whether these applications are widely spread in Oman.
- Whether these applications can be used to simulate some of the teachers' professional development practices.

As a result of the previous stage, nine mobile applications were chosen. These are - WhatsApp, Twitter, Facebook, Gmail, YouTube, Patalk, Gruveo, JusTalk and IMO.

Meanwhile, the workbooks that included similar activities to the experimental group were prepared to be utilised by control group1. Furthermore, the diary cards were also prepared in order to be used by control group2. During this period, a draft of the data collection instrument was ready. The researcher then started the process of recruiting participants. After carrying out this step, the prepared activities were used to trial with the pilot groups. This was in order to test the instruments of collecting data, and to investigate the suitability of the activities to attain their purposes. The results of the pilot study were then analysed. This step led to the re-drafting of the trial's activities and produced additional activities, but did not

lead to re-drafting the instruments. Finally, the main study conducted with the ultimate version of the intervention. The following mind map shows the development stages of the study intervention.
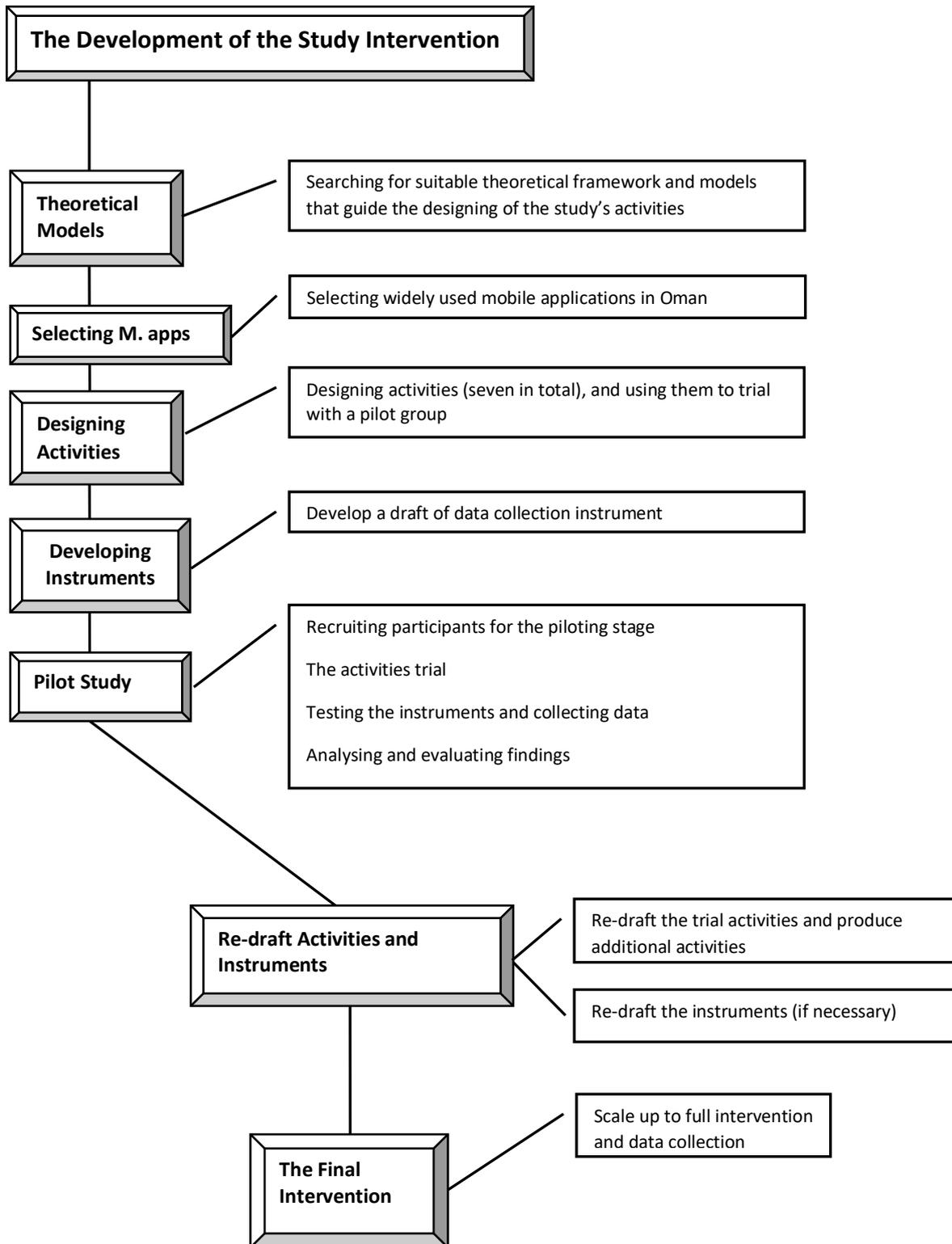
Figure 4.1: Mind map of the development stages of the study intervention

4.2 Theoretical Models of the Study's Activities

The theoretical framework of the study's activities that is related to teachers' reflective practices is based on two well-known cycles of reflection in the literature. The first is Gibb's Cycle and the other is Kolb's Cycle (see Literature Review Chapter, p.52-54). Whereas, regarding teachers' motivation towards teaching and planning lessons, the activities were designed according to the expectancy-value theory (see the Literature Review Chapter, p.65). This is because this theory is one of the prominent motivational theories are used to clarify teachers' motivation (Richardson et al., 2014). In addition, the researcher believes that it might be the most appropriate motivational theory to suit the suggested activities of this study. It seems it is much easier to prepare activities according to this theory rather than the other theories that are related to teachers' motivation. Both the experimental group and control group1 participated in seven activities during the piloting stage. The following discussion describes two of them, and identifies the rationale behind them. It shows how they were prepared according to the suggested reflective practice models and the motivation theory.

4.3 Selecting Mobile Applications and Designing Activities

The following are the initial forms of the activities that were suggested to be applied during piloting stage. The idea behind these activities, as mentioned previously, is based on comparing the impact of employing various mobile applications and workbooks as platforms to enhance reflective practices of Omani in-service science teachers and their motivation towards teaching and planning lessons. The following tables and charts present the mobile applications that were chosen, and how the draft activities were designed:

Activity 1: Planning Skills: *Experimental Group*

Activity1	Planning a lesson
Theoretical framework:	Kolb's Cycle and Expectancy-Value model
Goals	1- To enhance science teachers' reflective practices in planning. 2- To enhance science teachers' motivation towards planning.
Mobile Application	WhatsApp
Time period	One week

Table 4.1: Explaining how Kolb's Cycle was applied in Activity1 (Experimental Group)

1-Concrete Experience: Planning for a lesson.	Teachers will be put into pairs and every two teachers from the experimental group will be asked, before starting the intervention, to plan one week lesson.
2- Reflection: Discussion and evaluation of the plan before and after implementing.	These two plans will be evaluated by science teachers (experimental group) and the discussion will take place by utilising the synchronous mobile application, "WhatsApp". Their colleagues will reflect on this planned lesson and share their opinions with them. After that, they all reach a decision about which approach to follow in order to implement the lesson.
3-Abstract Conceptualisation: Reaching to a generalisation.	After implementing the lesson, every individual in the group will describe what was good and bad in relation to implementing the lesson, and what, if anything, could have been done to enrich the lesson.
4-Active Experimentation: Applying their new Knowledge in new situation.	Science teachers will summarise their new ideas and strategies to be applied, if they teach the same topic again.

Note: WhatsApp is *"a cross-platform instant messaging application for smartphones. It enables users to send and receive location information, images, video, audio and text messages in real-time to individuals and groups of friends at no cost"* (Church and de Oliveira, 2013, p.352).
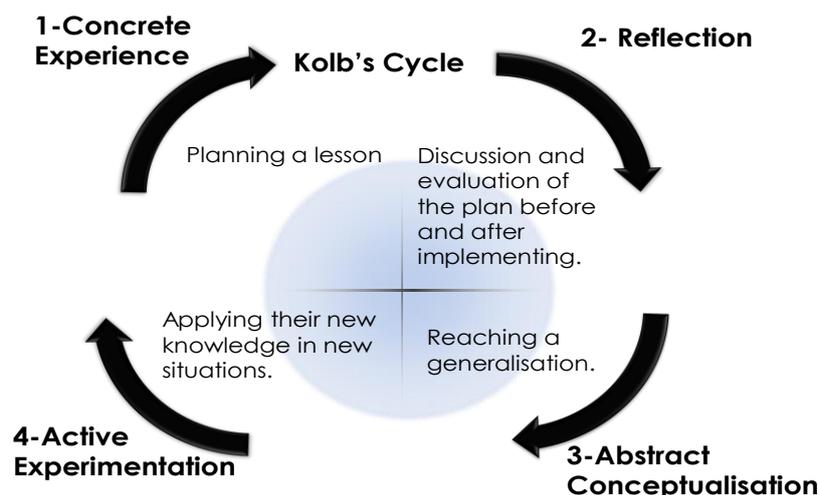
Figure 4.2: Chart showing how Kolb's Cycle was applied to improve teachers' planning skills

Table 4.2: Explaining how Expectancy–Value model was applied in Activity1 (Experimental Group)

Ability Beliefs	Before starting the discussion, the two science teachers will be asked by the researcher about their opinion of the plan, and to what extent they are satisfied with it.
Increasing Intrinsic Value	Discussion about their work by their colleagues could be interesting and enjoyable since cooperation and dialogues may increase motivation (Tauer and Harackiewicz, 2004).
Increasing Utility Value	If the discussion was useful and beneficial.
Increasing Attainment Value	A group of science teachers discuss how to plan a lesson. This may send an indirect message to participants that this skill is important.
Decreasing the Cost	By decreasing the number of plans that the science teacher has to prepare during the whole semester and by saving all their lesson plans on their smartphones.
Expectancy Beliefs	The researcher will ask the two teachers after completely finishing the activity, the extent to which they think that they are capable to prepare a suitable plan. The difference between their responses (Expectancy Beliefs - Ability Beliefs) will show the improvement in their expectancy regarding planning lessons.

Expectancy – Value Model
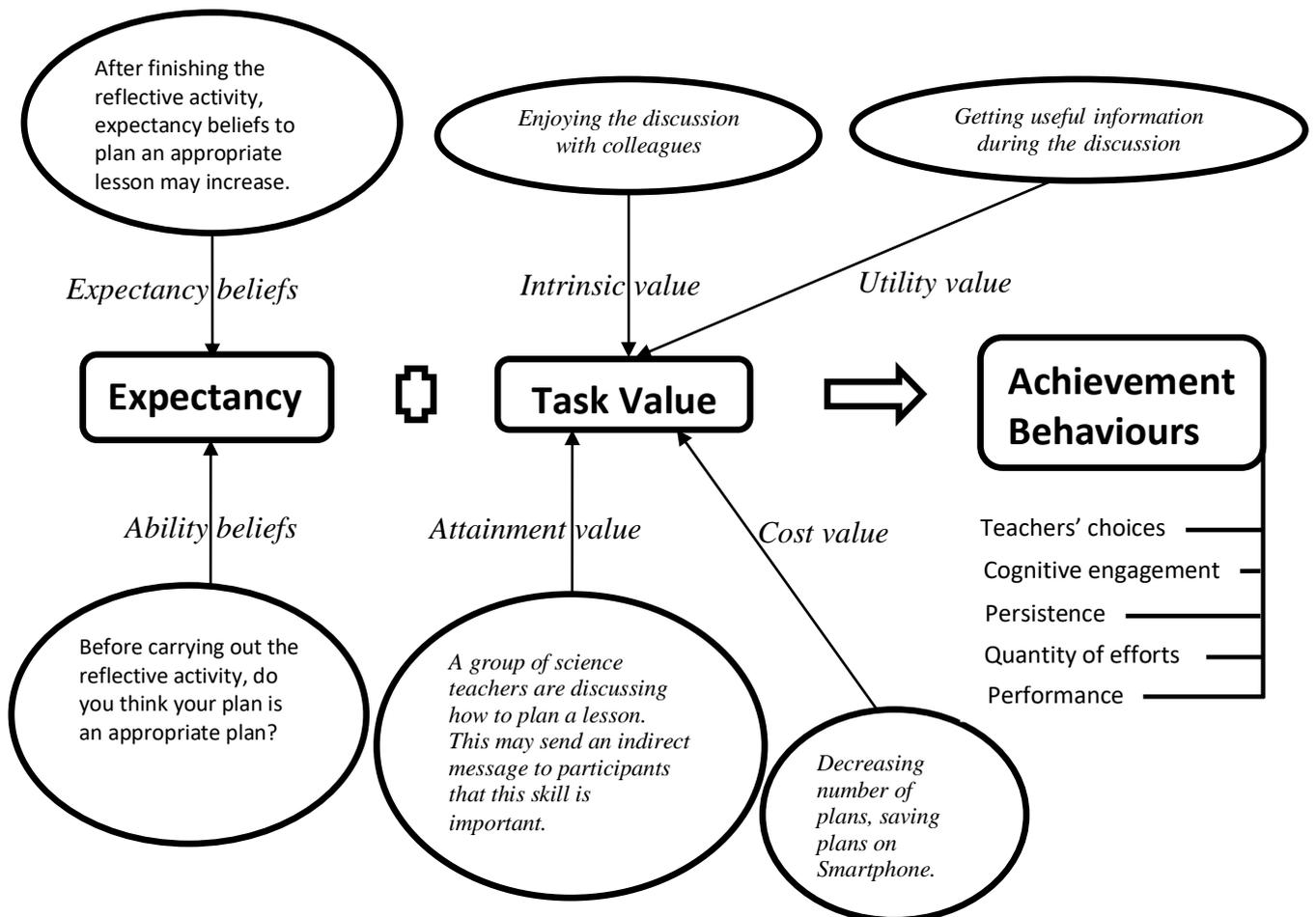
Figure 4.3: Chart explaining how Expectancy-Value model was applied for Activity1 (Experimental group)

Activity 1: Planning Skills: *Control Group1*

Activity1	Planning a lesson
Theoretical framework:	Kolb's Cycle and expectancy-value model
Goals	1- To enhance science teachers' reflective practices in planning.
	2- To enhance science teachers' motivation towards planning.
The platform	Workbooks
Time period	One week

Table 4.3: Explaining how Kolb's Cycle was Applied in Activity1 (Control Group1)

1-Concrete Experience: Planning for a lesson.	Every two teachers from the control group1 will be asked before starting the intervention to plan one week lesson.
2- Reflection: Discussion and evaluation of the plan before and after implementing.	These two plans will be sent to science teachers of the control group through school mail and they will evaluate them and make the necessarily changes.
3-Abstract Conceptualisation: Reaching to a generalisation.	After implementing the lesson, every individual in the group will send (to the Applied Science Department) their edited plan with description of what was good and was bad in relation with implementing the lesson, and what else could have been done to enrich the lesson.
4-Active Experimentation: Applying their new Knowledge in new situation.	They will summarise their new ideas and strategies which they are going to apply if they teach the same topic again.

Note: In-service science teachers will receive a copy of all the activity's documents at the end of the study (last week).

Table 4.4: How Expectancy–Value Model was Applied in Activity1 (Control Group1)

Ability Beliefs	Before starting the discussion, the two science teachers will be asked by the researcher about their opinion in the plan. To what extent they are satisfied about it?
Increasing Intrinsic Value	Discussion about their work by their colleagues might be interested.
Increasing Utility Value	If the discussion was useful and beneficial.
Increasing Attainment Value	A group of science teachers are discussing how to plan a lesson. This means that this skill is important.
Decreasing the Cost	By decreasing the number of plans that science teachers have to prepare during the whole semester.
Expectancy Beliefs	The researcher will ask the two teachers after completely finishing from the activity, to what extent they believe that they are able to prepare a suitable plan.

Activity 2: Chatting about a lesson (Teaching Skills): *Experimental Group*

Activity 2	Chatting about a lesson (Teaching Skills).
Theoretical framework:	Gibbs's Cycle and Expectancy-Value model
Goals	1- To enhance science teachers' reflective practices in action (during teaching).
	2- To enhance science teachers' motivation towards teaching.
Mobile Application	Paltalk application or WhatsApp application
Time period	Every two weeks for 40 minutes

The Summary: The experimental group will be divided into two groups with four or five members in each group. Every group will discuss a scenario of a lesson, given by the researcher. The scenario could be displayed by using YouTube. The discussion will be conducted using the mobile app Paltalk, which has features including video, audio and writing, chatting, or by using WhatsApp. Every participant will discuss and give feedback based on Gibb's Cycle.

Table 4.5: How Gibb's Cycle was Applied in Activity2 (Experimental Group)

1-Description:	The scenario of the lesson will be given through the application two days before the determined time for chatting.
2- Feelings:	Talk about your feeling and thinking about the teachers' practices during their teaching.
3- Evaluation:	What was good and bad during their teaching?
4- Analysis:	Read more in the literature or rely on your inspectors and educational experts' opinions to support your opinions about the teaching process. (use internet to search, such as Google)
5- Conclusion:	What could you do to improve the lesson?
6- Action Plan:	If you taught the same lesson, what would you do?
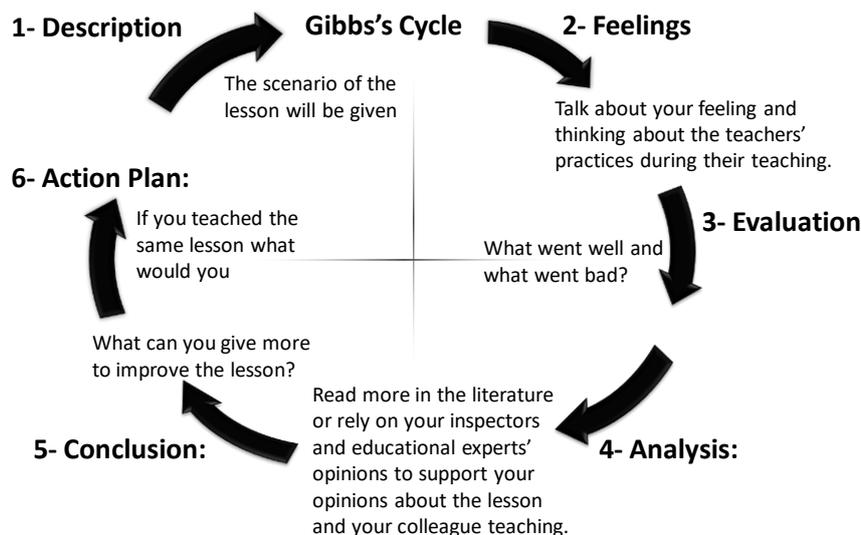
Figure 4.4: Chart showing how Gibb's Cycle was applied in activity2

Table 4.6: Explaining how Expectancy–value Model was Applied in Activity2 (Experimental Group)

Ability Beliefs	Before starting the discussion, teachers will answer this question - Would you teach better than the teacher in the scenario?
Increasing Intrinsic Value	Enjoying discussions with colleagues.
Increasing Utility Value	Getting useful information during discussions.
Increasing Attainment Value	Your colleagues are discussing a scenario about teaching trying to learn; this is something that might be important for you.
Decreasing the Cost	No need to have your colleagues from other schools physically present in order to conduct this discussion
Expectancy Beliefs	After chatting and discussions with colleagues, expectancy beliefs about their teaching skills may increase.

Expectancy – Value Model
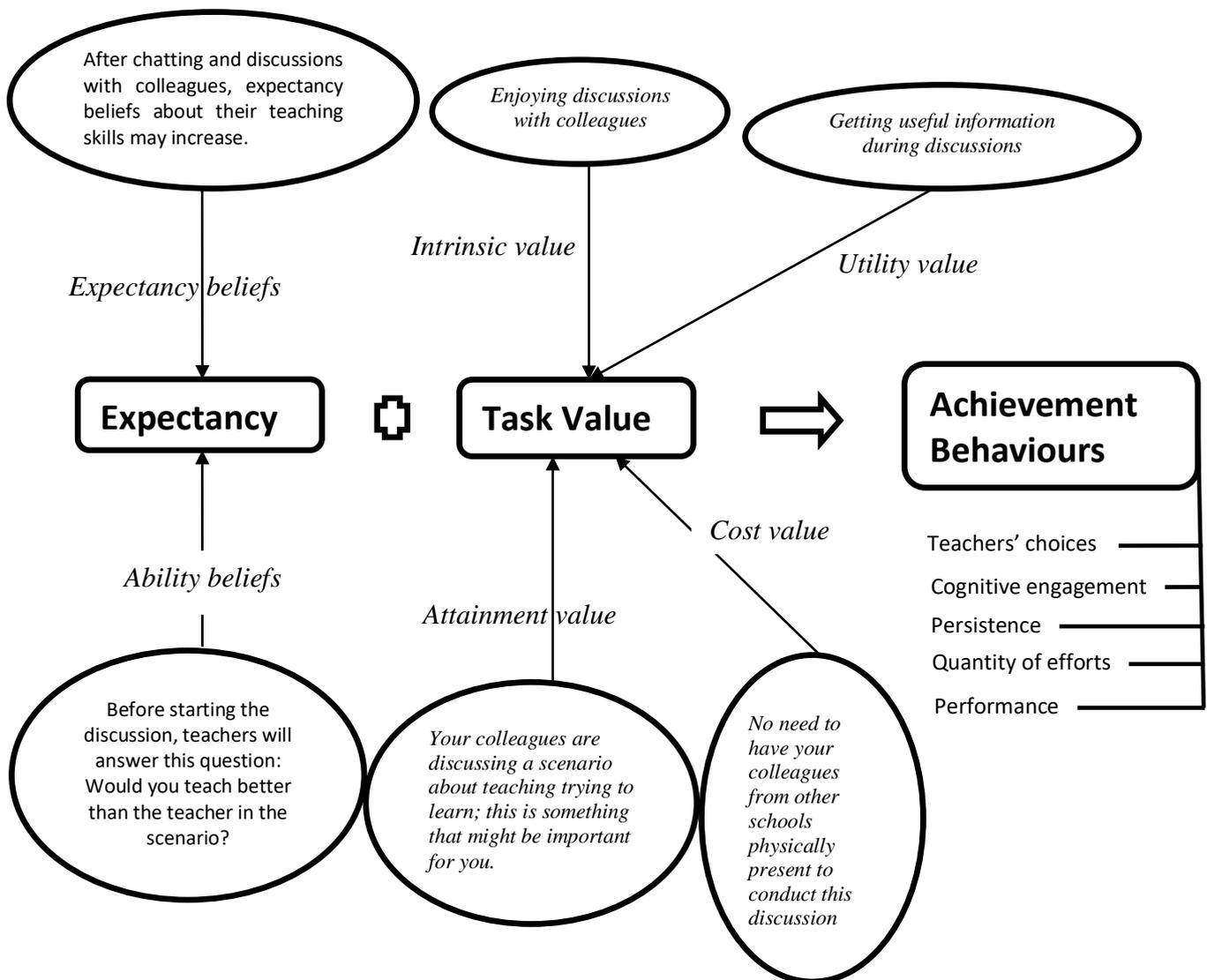
Figure 4.5: Chart explaining how the Expectancy-Value model was applied for activity2 (Experimental group)

Activity 2: Chatting about a lesson (Teaching Skills): *Control Group1*

Activity 2	Chatting about a lesson (Teaching Skills)
Theoretical framework:	Gibbs's Cycle and Expectancy-Value Model
Goals	1- To enhance science teachers' reflective practices in action (during teaching).
	2- To enhance science teachers' motivation towards teaching.
The platform	Workbooks
Time period	Every two weeks.

The Summary: Each member of Control Group1 will be given a written scenario of a lesson and will be asked to reflect on this scenario alone or with any science teacher colleagues based on Gibb's Cycle.

Table 4.7: Explaining how Gibb's Cycle was Applied in Activity2 (Control Group1)

1-Description:	The scenario will be given.
2- Feelings:	Talk about your feelings and thinking about the teachers' practices during his teaching.
3- Evaluation:	What was good and bad during their teaching?
4- Analysis:	Read more in the literature or rely on your inspectors and educational experts' opinions to support your opinions about the teaching process.
5- Conclusion:	What can you contribute to improve the lesson?
6- Action Plan:	If you taught the same lesson what would you do?

Table 4.8: Explaining how Expectancy–Value Model was Applied in Activity2 (Control Group1)

Ability Beliefs	Before starting the discussion, teachers will answer this question: Would you teach better than the teacher in the scenario?
Increasing Intrinsic Value	Reflecting on other teachers' teaching might be interesting.
Increasing Utility Value	Giving feedback about other teachers' teaching might be useful for improving their own teaching.
Increasing Attainment Value	Could be if he found a colleague to discuss the scenario with.
Decreasing the Cost	No need to view a lesson and describe it because the scenarios are provided.
Expectancy Beliefs	After reflecting alone or with colleagues, expectancy beliefs about his teaching skills may increase.

Control Group2 Activities

In terms of control group2, participants were given diary cards for the purpose of writing and recording their use of smartphones and their applications for everything related to the teaching, learning, and professional development processes. The following figure shows this diary card:

Diary Card

Record any usage of mobile applications (WhatsApp, YouTube, Camera, Twitter, Facebook, Google, Gmail, etc.) in teaching, learning and your professional development processes

N	Name of Application	Area of Usage *(teaching, learning and communicating with: a supervisor, teachers, etc.)*	Comments
In case of not using any application, please write 'No applications used' below.			

Figure 4.6: Diary Card

4.4 Pilot Study

Introduction

The requirements for the pilot study of this current research were very clear. The first essential step relates to understanding the way of implementing the main study. Conducting an appropriate pilot study may lead to clarifying the required path in order to achieve the study's goals (Hazzi and Maldaon, 2015). This could show obstacles that might be faced by the researcher while conducting the main study. The following discussion involves the definitions of the pilot study, the aims of the researcher by conducting it, and why it is important. Finally, it shows the feedback from the pilot study.

4.4.1 Definition

A pilot study *"is a small-scale version, or trial run, done in preparation for a major study"* (Polit and Beck, 1985. p.563), or *"A small-scale test of the methods and procedures to be used on a larger scale if the pilot study demonstrates that these methods and procedures can work"* (Porta, 2006, p.215). However, in this study, this term is used to explore the ability to implement certain activities, interviews, and questionnaires with Omani in-service science teachers.

4.4.2 Aims of the pilot study for the current study

Different concerns and aspects connected to this current study arose, which may affect its final outcomes. The main issues were to understand to what extent Omani in-service science teachers adopt implementing activities, based on mobile applications, and their capability of applying them. Therefore, the aims of the pilot study of this research could be summarised as follows:

1- Exploring how to design activities based on mobile applications.
2- Understanding the interaction of Omani in-service science teachers with some activities based on mobile applications.
3- Checking the efficiency of some mobile applications and their affordances.
4- Understanding how to apply Kolb's Cycle and Gibb's Cycle in designing activities that seek to improve science teachers' reflective practices.
5- Learning how to use the theoretical framework of Value-Expectancy Theory in designing activities that could increase science teachers' motivation.
6- Testing the instruments of the study - the questionnaires (after being translated from English to Arabic) and interview questions.
7- Revealing any unexpected difficulties that might affect the main study, especially any logistical issues, such as area differences in (3G or 4G) coverage, and the implications of that on using mobile applications.
8- Planning for recruitment strategies of the main study.

4.4.3 Importance of the pilot study

It is essential to be aware of where the main study might face obstacles, and whether these obstacles can be overcome or not. The pilot study could show any administration aspects that need to be controlled, and it may reveal the feasibility of the research (Hazzi and Maldaon, 2015). *"It is needed to detect possible flaws in measurement procedures including*

instructions, time limits, et cetera" (Caltiz, 2009, p.258). In general, it could enhance the outcome of the main study, and it also could provide a clear assessment about the instruments of the study, such as the questionnaires and interview items, in order to modify them if needed (Hazzi and Maldaon, 2015).

4.4.4 Implementing the pilot study

The pilot study lasted for about one month during the period of 11th September 2016 to 16th October 2016. This period of time was sufficient to check if the seven designed activities and their implementing strategies were appropriate in terms of teacher acceptance to employ them for their professional development purposes, and in terms of the capability of these activities to attain the study's goals. It was also a suitable period to reveal the affordances of various mobile applications. The idea in respect of the experimental group was to check as many of the mobile applications as possible in order to distinguish between them according to their affordances, especially the engagement and interaction aspects, and to clearly decide which application could be used and which one should be ignored, as well as to decide how many mobile applications could be applied in the main study. On other hand, this period of time was sufficient to comprehend how both control group 1 and 2 interacted with the provided activities.

The design of this study, as mentioned previously, involved three groups of respondents: the experimental group and two control groups. The experimental group were asked to carry out a programme of activities to enhance reflective practices and motivation by using mobile applications, while control group1 were exposed to the same activities, but without using mobile applications, whereas control group 2 were asked to use mobile applications in ways which may enhance their reflective practices and motivation, but without following a professional development programme. Thus, I began with preparing the materials needed for the study, such as creating accounts in the Gmail app, Facebook app, and Twitter app for the experimental group, and preparing activities books for control group1, and diary cards for control group2.

The sample size of this pilot study was about 12 per cent of the study population. This is because it is clear from the previous aims list that the main goal is to test the efficiency of the activities, rather than testing the reliability or validity of the questionnaires (which need a larger sample size). Adding to this, Baker (1994) claims that 10–20 per cent of the population is appropriate to conduct a pilot study (as cited in Simon, 2011).

On the 21st August 2016, the researcher joined the science inspectors meeting at the Applied Science Department, where the announcement of the study was given, and its idea and aims clearly explained. These inspectors had been asked to inform the 10th Grade science teachers in the region about the study, and to provide an updated list of those teachers. In addition, the researcher met senior inspectors of Physics, Chemistry and Biology in the Department, and requested their support with conducting the study during the next semester, bearing in mind that some of 10th Grade science teachers in the region would be taking part in this study.

The sample of the pilot study was 9th Grade Omani in-service science teachers, despite the fact that this sample did not clearly represent the sample in the main study. The researcher thought it better to utilise this, since the population of the 10th Grade science teachers was so limited, and both of these populations (9th and 10th grade science teachers) have the same characteristics.

Recruiting for the pilot study sample took place from 24th August 2016 to 8th September 2016. The researcher visited different schools in the region in order to recruit volunteer teachers. Successfully, 19 teachers were recruited; nine teachers (four female and five male) for the experimental group, five teachers for control group1 (three female, two male), and five teachers (two female and three male) for control group 2. They had all received an informed consent letter regarding both the instruments and the interviews. The number of participants in the experimental group was higher than the other groups because of the need to get as much feedback as possible from this group, and to reduce the effect of withdrawal possibility in this crucial group.

All of these groups were asked to fill in the questionnaires before commencing the activities, and they had been told that these activities would last for one month. Some of the interviews were conducted with two participants from each group randomly. After one month, these teachers were asked to complete the questionnaires again, and the interviews were conducted again with same participants who had been previously interviewed.

4.4.5 Feedback from the pilot study

1. Some science teachers in the experimental group and control group1did not partake in some of these activities because they were not able to find the time required to do so, and also felt uncomfortable with writing too much while attempting to answer open

questions. Thus, I learned that it is better to prepare activities that contain mixed open and closed questions (multiple choices).

2. Some teachers need to be reminded to actually carry out the activities, otherwise they would forget to do them. Thus, although it is quite complicated to find an appropriate technique, with the two control groups, to achieve this purpose, it is possible to use an application such as WhatsApp in the experimental group, which could show a part of the affordances of mobile technology.

3. Some participants in control group2 felt that they did not see any benefit of completing the diary cards, which may cause withdrawal from the study. This leads to the importance of recruiting extra participants for this group. In fact, it is important to have extra participants for all groups as some of the teachers might change the class that they teach, or might take long holidays, for a variety of different reasons (i.e. illness, pregnancy, etc.) and the percentage of their responding to these activities might vary from one participant to another.

4. Some female teachers accepted to join the study but, they did not accept the use of apps that display their telephone numbers to others, except for the researcher. This means it would not be realistic to use applications that do not secure the participant's identity.

5. Some science teachers do not have enough experience to use some of the mobile applications, and thus it is important to teach them how to do so before starting, and during, the intervention.

6. Some video call apps such as Gruveo, IMO, and JusTalk that were suggested to be used by the experimental group, which can be applied in an area that has 4G cover, could not be conducted in areas that only have 3G cover. Unfortunately, all rural areas are limited to 3G coverage. Thus, they will not be used in this study.

7. WhatsApp was used by the majority of science teachers, and thus, it could be the best application for:

   a. Giving instructions to the experimental group.
   b. Teaching the experimental group how to use some apps.

8. Facebook was the best app to create a suitable environment for both male and female participants, in order to interact with each other, as it secures their identity and privacy. Thus, in the main study, this app will be the first choice to be utilised.

9. It is important to decrease the number of apps utilised by the experimental group in order to avoid confusion. Thus, the main study will focus on using fewer apps.

10. Participants in both the experimental group and control group1 were satisfied with having a few completed ready-made lesson plans. Many of them told me that they also learned something from these plans. Thus, it seems that certain ready-made lesson plans, prepared by an expert, might potentially be a good way for teachers to reflect on planning, by comparing their ways of planning with others, and at the same time this could increase teachers' motivation towards planning, as it is a way of reducing their burden in planning lessons. Thus, in the main study I suggest preparing some lesson plans and providing teachers with some extra reading about various scientific aspects.

4.5 The Intervention

Introduction

The following part describes the treatment of the study groups, the intervention activities, the list of activities of the experimental group, and its counterpart in the control group1, and finally shows the key differences between the training programmes of the three groups.

4.5.1 The treatments of the study groups

A training programme, hosted mainly by two mobile applications, Twitter and Facebook, which are also considered as forms of social network sites, was designed based on two models of reflection (Kolb's Cycle and Gibb's Cycle), and on a motivational theory known as the expectancy-value theory. The aim of this programme was to improve teachers' reflective practices and their motivation, which are considered to be significant key factors to develop teachers professionally. In order to be sure that participants fully understand their role and know how to implement these activities, other mobile applications - WhatsApp and Gmail, were also used to receive any questions or to send any instructions. This programme lasted for 14 weeks. After inviting extra Omani science teachers to be engaged in the study, 83 Omani in-service science teachers in total participated in the programme. 28 of these

participants, who have used mobile technology (smart phone applications) then formed the experimental group (chosen randomly), in order to respond to the prepared activities that aimed to enhance their reflective practices and motivation towards teaching.

On the other hand, control group1 consisted of 26 Omani in-service science teachers, who were chosen randomly. At the start of the intervention, they used a workbook that contained almost all of the activities that the experimental group had, except those activities that could not be undertaken without using mobile technology. Finally, nothing was offered to the 29 Omani in-service science teachers that represented a control group 2, except for being encouraged to use mobile applications for educational purposes, and they were asked to complete diary cards to show the extent to which they use mobile applications in their efforts to develop their profession as teachers.

Table 4.9: Treatments of Study Groups

n	Group	Treatment	Number of Participants
1	Experimental Group	Using Mobile Applications with a specific programme.	28
2	Control Group 1	Using Workbooks with a specific programme.	26
3	Control Group 2	Using Mobile Applications without a specific programme (Recording their activities using diary cards).	29
	The Total		83

4.5.2 Key differences between experimental group and both control groups

The experimental group is distinguished from the two control groups in many aspects, including the formation of a virtual society designed to promote discussion and dialogue among participants about skills of teaching or skills of planning. The experimental group's programme could provide support and immediate feedback for the participants. It also allows them to reach unlimited sources of knowledge and information that could foster both their reflective practices and motivation. Furthermore, being a part of an educational society may improve motivation towards working as a teacher. In contrast, the participants of control group1 could perform self-reflection only, as they were not able to reach unlimited sources of knowledge and information. While the participants of control group2 could reach unlimited sources of knowledge and information, they did not have a specific programme to improve

reflective practices and motivation towards teaching and planning lessons. The following table explains the key variations between the experimental group and both control groups:

Table 4.10: Key differences between Experimental Group and both Control Groups

Framework	Groups	Reflective practices	Motivation
(Gibb's Cycle and Kolb's Cycle) (Expectancy- value Theory)	Experimental group	Creating an online community Dialogue and discussion between teachers. Receiving immediate feedback.	Using more senses Increasing the feeling of being part of an educational society. Getting support from colleagues in the group.
		Reaching unlimited sources of knowledge and information that could foster both their reflective practices and motivation.	
(Gibb's Cycle and Kolb's Cycle) (Expectancy- value Theory)	Control group1	Dialogue might not be available. Feedback might not be available. Sources of knowledge and information are limited.	Fewer senses will be used. Feeling as a part of an educational society is less. No clear support from colleagues.
No Models or Theories	Control group2	No Dialogue No feedback	No clear support from colleagues. Feeling as a part of an educational society is less.
		Reaching unlimited sources of knowledge and information that could foster their both reflective practices and motivation, but without following a specific programme.	

4.5.3 Intervention activities

For the purpose of explaining the design of the activities, examples of two activities that have three versions each are shown as the following. Version 1 shows the basic design of the activity before utilising mobile applications, while Version 2 explains the relationship between the adopted models or theories, and the questions of the activity. Finally, the last version shows how the activity looks like on mobile applications (Facebook and Twitter). In addition, the document includes two examples of activities for control group1. The following table summarises the examples of two activities for both groups, the experimental group and control group1:

Table 4.11: Two Activities for both Groups (Experimental group and Control group1)

groups	Name of the activity	Model of Reflective Practices	Theory of Motivation	Applications
Experimental group	Planning a lesson	Kolb's Cycle		Twitter
	Taking Care of Differentiation	Gibb's Cycle	Expectancy-Value Model	Facebook
Control group1	Planning a lesson	Kolb's Cycle		Workbook
	Taking Care of Differentiation	Gibb's Cycle		Workbook

Each of the following experimental group's activities starts with a description explaining the idea of the activity, the role of participants, and the type of mobile applications that were used. After that, the rationale behind using the determined mobile application, and the goals of the activity from the point view of science teachers and the researchers. Next, the discussion will focus on the activities of both groups as mentioned previously. Then, a list of 12 activities for the experimental group will be shown. Each of these activities took place over one week in order to give the participants the necessary time for reflection. Thus, the whole intervention lasted for 12 weeks. Finally, the document will end with revealing the diary cards for control group2.

Activity 1: Planning a lesson: *Experimental group*

A. Description:

The researcher prepared some lesson plans. Then, participants reflected on these ready lesson plans and gave their feedback about the plans through answering questions about an activity designed on Twitter, based on Kolb's Cycle model and the Expectancy-Value theory. The researcher provided a Twitter account for each participant, using a nickname rather than their real name. This activity lasted for one week.

B. Goals:

Teachers' point of view:

- Improving the lesson plans and developing their skill in planning lessons.

Researcher's point view:

- *Developing science teachers' reflective practices and their motivation towards planning lessons:* Comparing their method of planning with others may lead to reflecting on their planning skills, and buy time with continuous practice of such activities. They may improve not only their skills in planning lessons, but also their reflective practice levels.

- *Improving science teachers' motivation towards planning lessons:* Getting ready lesson plans could reduce their efforts in planning, which may lead to increase their motivation towards planning lessons, especially if we considered cost as one factor that affects motivation according to the Expectancy-Value Theory.

C. Rationale of using Twitter:

1- This application provides a secure identity for participants. Thus, it could be suitable for creating a discussion environment for male and female science teachers without violating any values of the community.

2- Twitter is one of the most well-known applications in social media and thus, some science teachers might be interested to learn how to utilise it, especially those who have never previously used it.

3- Twitter provides the possibility of putting questions and steps in logical order.

Table 4.12: Version1 of Activity1 (Experimental group/Control group)

Reflective Cycle	Kolb's Cycle
Platforms	Twitter/Workbook
Time period	One week

A. To what extent (1-10) do you believe that you have the ability to plan a lesson perfectly? ....

1- What are the strong points in this plan? (Choose an appropriate letter, you can choose more than one letter)
a. Teaching methods are varied. b. Clear learning strategies. c. Educational tools are varied.
d. The logical sequence of the lesson. r. Student activity is more than teacher activity. x. Employment of education technology.
u. Link science to student life. h. Showing individual differences.
w. Other: .... (Write it).

2- What are the weak points in this plan? (Choose an appropriate letter, you can choose more than one letter)
a. Teaching methods are limited. b. Learning strategies are unclear. c. Teaching aids are not available.
d. There is no logical sequence for the lesson. r. Teacher activity is more than student activity.
u. Did not employ education technology.
x. There is no link to the science of student life. h. There is no consideration for individual differences.
w. Other: .... (Write it).

3- After determining the strengths and weaknesses of this plan, are there any generalisations or conclusions which you have noted and related to planning a lesson? (Choose an appropriate letter, you can choose more than one letter)
a. Very high number of low level students in this class so you have to reflect and think about that.
b. You must adopt learning strategies that are capable of making students work hard to achieve lesson goals.
c. The provision of teaching aids and the employment of educational technology are indispensable in any lesson.
d. Students in this class need to strengthen their motivation to learn. r. planning of the lesson should focus on making students the centre of the teaching and learning process. x. individual activity is better than group activity.

u. It is important to start any lesson by linking the topic to the student's life.

h. The system must prevail before starting the teaching process.

 w. Other: .... (Write it).

4- Explain your plan in applying this new generalisation in future. (Choose an appropriate letter, you can choose more than one letter)

a. A quarter of an hour a day will be spent with a low-level student to discuss and understand his problems that hinder his learning.

b. In order to stimulate students' motivation, you need to search in educational literature. Thus, you will devote some time to learn experiences of others in this regard.   c. You will search books or online for new teaching methods.   d. You will learn how to download videos from the Internet and how to edit then.

r. You will reflect on each lesson to find ways to overcome students' learning disabilities.   x. You will rethink how you apply activities in group form.

u. You are a distinguished teacher with many years of experience and you do not need to reflect. h. Teaching of each concept or phenomenon will begin by explaining the importance of that concept or phenomenon in the students' life in order to increase their motivation.

w. Other: .... (Write it).

B. To what extent (1-10) do you believe that you have the ability to plan a lesson perfectly? ....

C. Do you consider this activity as: (Circle a number in each choices from a - g)

   a. Useful----10----9----8----7----8----7----6----5----4----3----2----1----Not useful.
   b. Important ----10----9----8----7----8----7----6----5----4----3----2----1---- Not important
   c. Interesting ----10----9----8----7----8----7----6----5----4----3----2----1---- Not interesting**.**
   d. Not costly ----10----9----8----7----8----7----6----5----4----3----2----1---- Costly

The following chart is a reminder of Kolb's Cycle model, of which the previous activity depends on in order to enhance teachers' reflective practices regarding lesson plans:
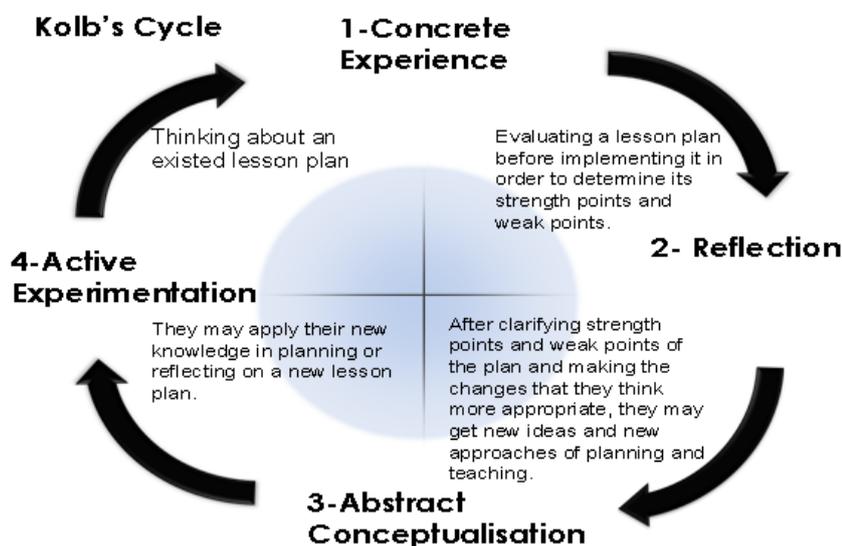
Figure 4.7: Chart showing how Kolb's Cycle was applied in activity1

In addition, the following chart shows the Expectancy-Value theory of which the previous activity depends on in order to enhance teachers' motivation towards planning lesson plans:
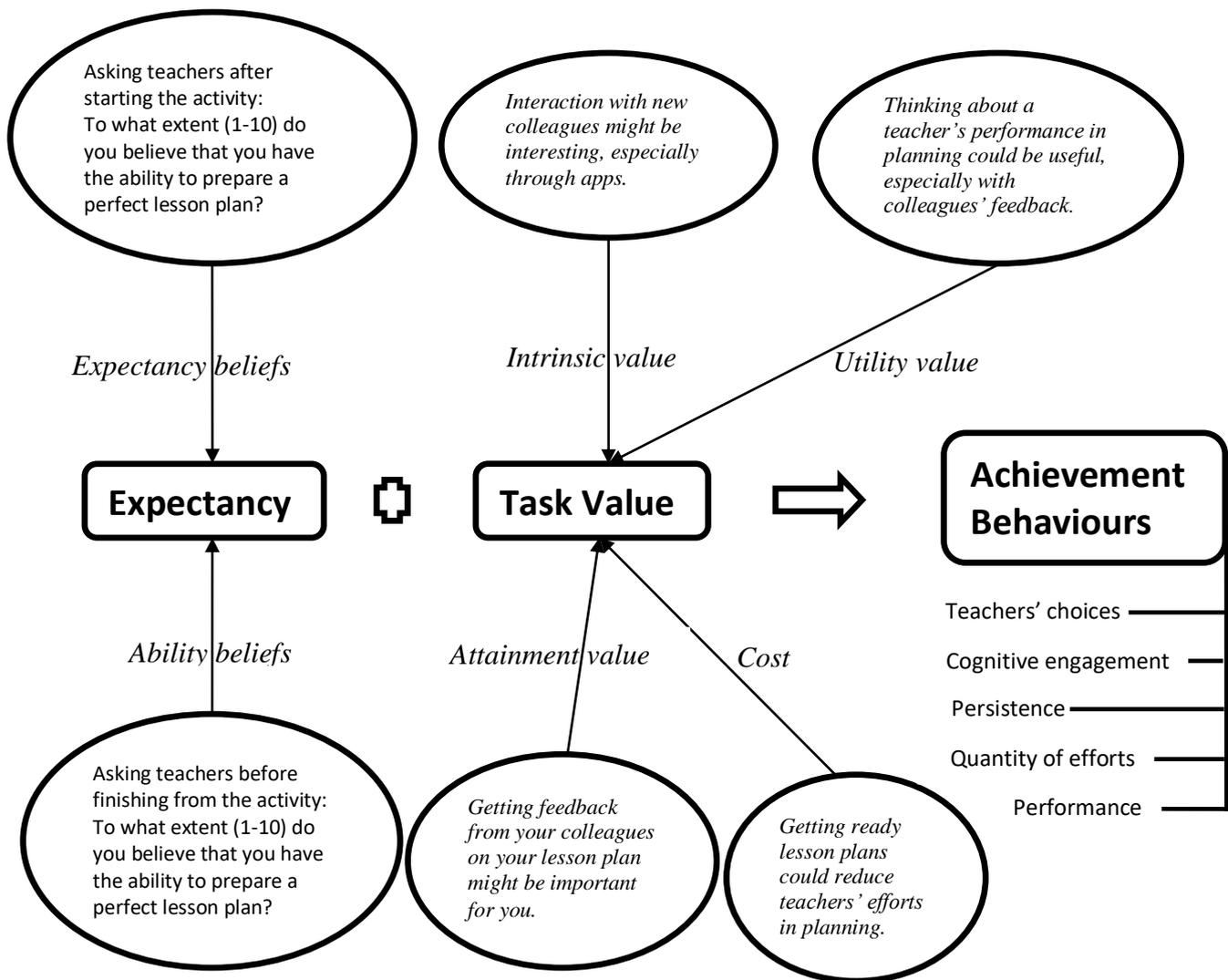
Figure 4.8: Chart explaining how the Expectancy–Value model was applied in activity1

Version 2 of Activity 1: **Explanation of the relationship between adopted models or theories and the activity questions.**

The comments (on the right side) show how each question in the activity is related to the adopted models of reflective practices and motivation.

Figure 4.9: Version 2 of Activity1

Version 3 of Activity 1: *Experimental group*

The next screenshots show how the participants of the experimental group viewed the previous activity (in Arabic) using Twitter.

Twitter activity interface

Twitter activity interface

Attachment shows ready-made lesson plan

A question about the extent to which teachers have the ability to plan lessons perfectly (Ability Beliefs).
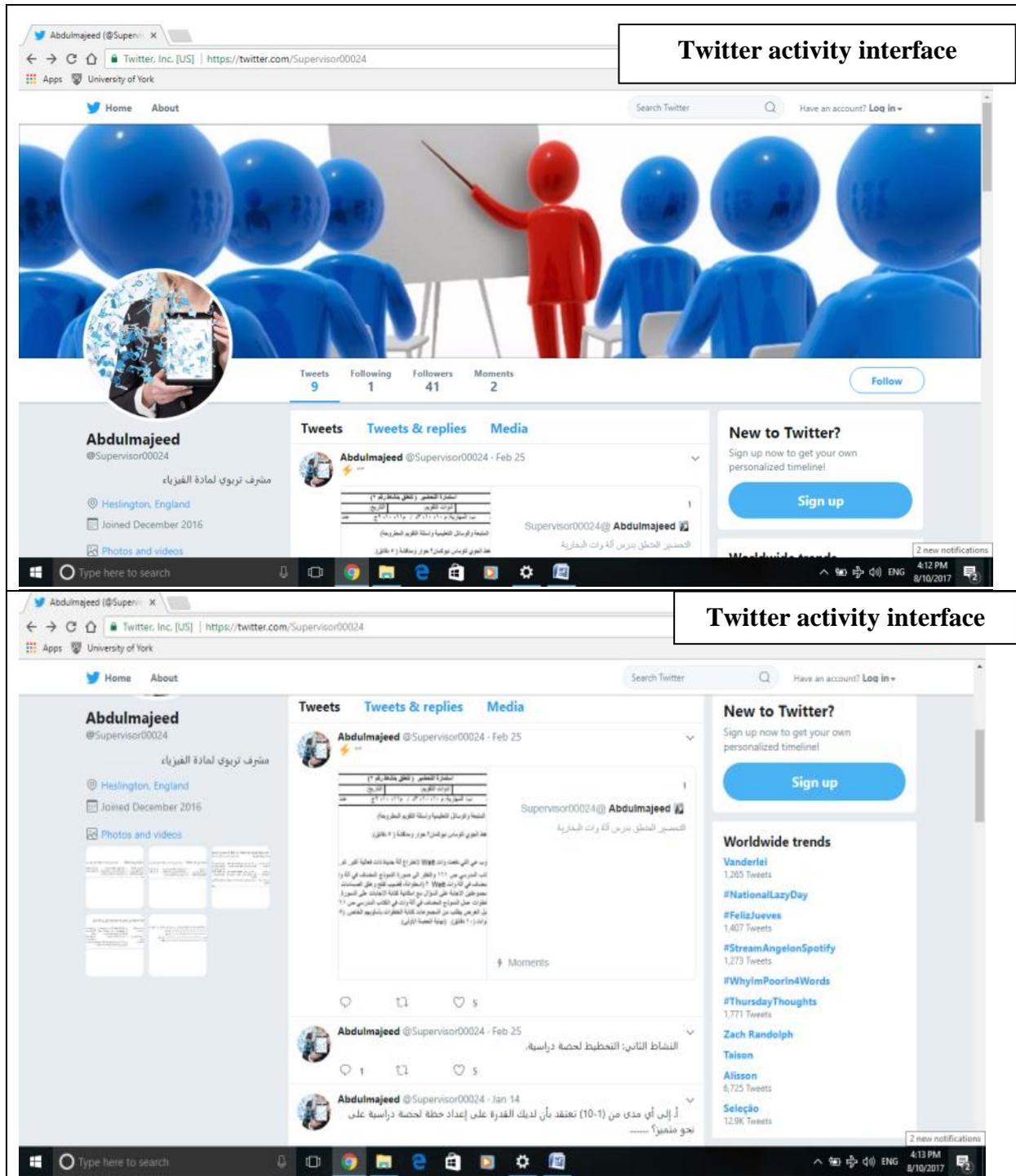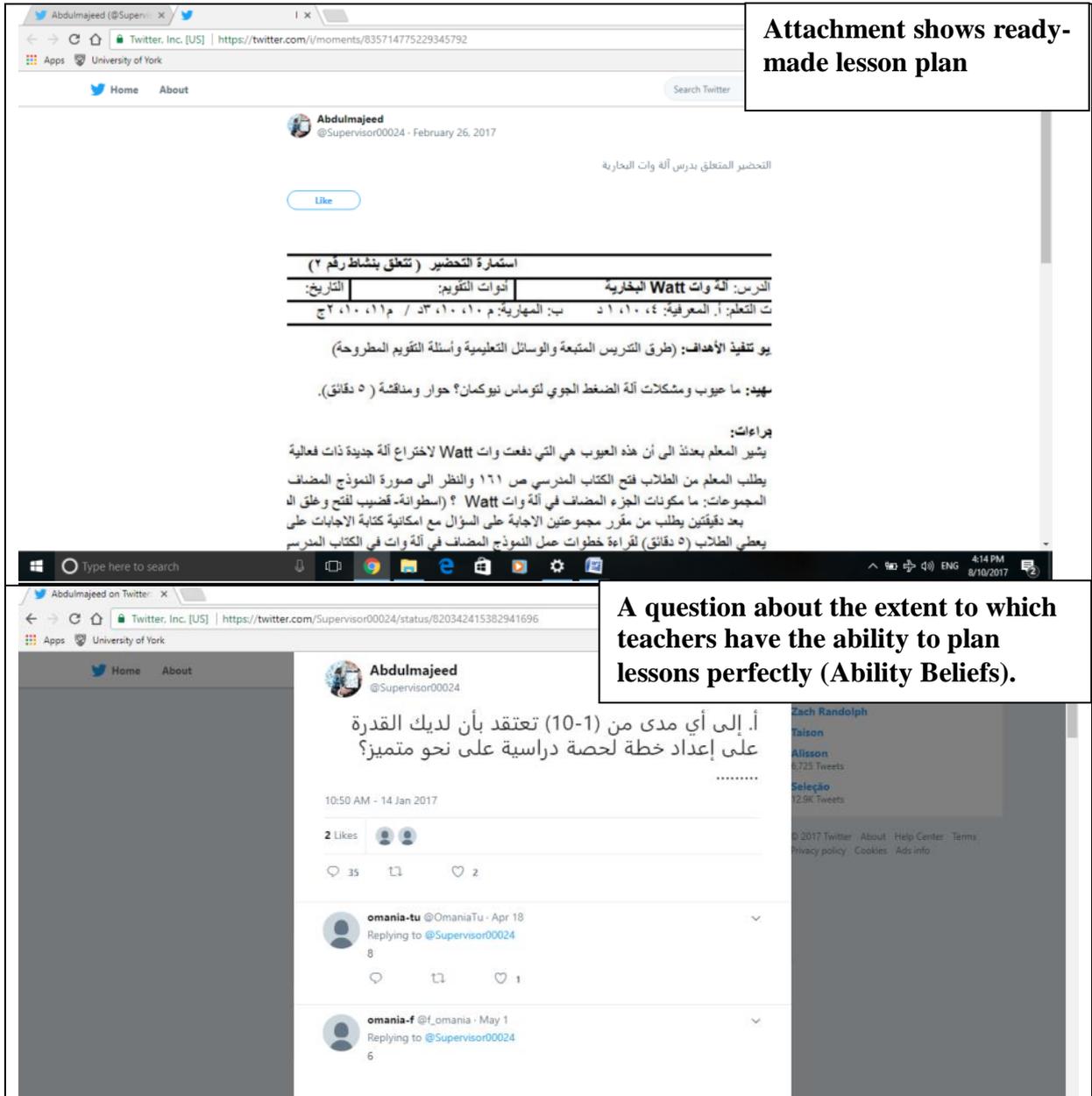
Figure 4.10: Version 3 of Activity 1 (Experimental group)

To see more examples of Version3 ('How the participants of the experimental group viewed the previous activity (in Arabic) using Twitter'), see Appendix C, p.306.

Version 3 of Activity 1: Planning a Lesson: *Control group1*

Below is an illustration of how the activity1 was viewed by the participants of the control group1, who used the workbook.

النشاط رقم (2): التخطيط لحصة دراسية:

Table 4.13: Version3 of Activity1 (Control group1)

Ability beliefs	أ. إلى أي مدى من (1-10) تعتقد بأن لديك القدرة على إعداد خطة لحصة دراسية على نحو متميز؟ ....
Concrete Experience	تأمل في التخطيط (التحضير) السابق لحصة دراسية وأجب عن الأسئلة التالية:

Reflective observation	1- ما نقاط القوة في هذه الخطة؟ *(ضع دائرة حول الرمز المناسب، يمكنك اختيار أكثر من رمز)*

ج. الوسائل التعليمية متنوعة   ب. استراتيجيات التعلم واضحة   أ.طرق التدريس متنوعة
ط. توظيف تكنولوجيا التعليم   ر. نشاط الطالب أكثر من نشاط المعلم   د.التسلسل المنطقي للدرس
هـ. تتضح فيها مراعاة الفروق الفردية.   ع. ربط العلوم بحياة الطالب
و. أخرى: ...... (اكتبها).

Reflective observation *(ضع دائرة حول الرمز المناسب، يمكنك اختيار أكثر من رمز)*	2- ما نقاط الضعف في هذه الخطة؟

ج. الوسائل التعليمية غير متوفرة   ب. استراتيجيات التعلم غير واضحة   أ.طرق التدريس محدودة
ط. لم توظف تكنولوجيا التعليم   ر. نشاط المعلم أكثر من نشاط الطالب   د.لا يوجد تسلسل المنطقي للدرس
هـ. لا يوجد مراعاة للفروق الفردية   ع. لا يوجد ربط للعلوم بحياة الطالب
و. أخرى: ...... (اكتبها).

3- بعد تحديدك لنقاط القوة ونقاط الضعف لهذه الخطة، هل هناك أية تعميمات استنتجتها وترتبط بعملية التخطيط لحصة دراسية؟ اذكرها. *(ضع دائرة حول الرمز المناسب، يمكنك اختيار أكثر من رمز)*
Abstract Conceptualization

ج.توفر الوسائل التعليمية وتوظيف تكنولوجيا التعليم أمر لا غنى عنه في أي درس.   ب. لابد من تبني استراتيجيات تعلم تجعل الطالب مندمجا في تحقيق أهداف الحصة.   أ. التخطيط الجيد لطرق التدريس وتنوعها يزيد من دافعية الطلاب

ط. النشاط الفردي أفضل من النشاط الجماعي   ر. لابد أن يركز التخطيط للحصة على يكون الطالب محور العمل والنشاط في الحصة   د. لتدريس مفهوم معين لابد من توظيف اما الطريقة الاستقرائية أو الطريقة الاستنتاجية.

هـ. لمراعاة الفروق الفردية لابد من توظيف استراتيجية التعلم في مجموعات   ع. من المهم بدء أية حصة بربط موضوع الدرس بحياة الطالب.
و. أخرى: ...... (اكتبها).

4- اشرح خطتك المستقبلية في تطبيق هذه التعميمات التي توصلت اليها. *(ضع دائرة حول الرمز المناسب، يمكنك اختيار أكثر من رمز)*

Active Experimentation

ج. ستبحث في الكتب أو في الانترنت عن طرق تدريس جديدة.   ب. عند كل تخطيط لأي درس ستبحث في الـ YouTube أو في محركات البحث المختلفة عن أي فلم يرتبط بالدرس.   أ. البحث في الانترنت عن خطط جاهزة عن موضوع الدرس والاستفادة منها.

ط. ستعيد النظر في أسلوب توظيفك للأنشطة الجماعية   ر. ستزيد من الأنشطة الفردية   د. تقوم بتعلم كيفية تحميل الفيديو من الانترنت وكيفية تقطيعه.

هـ. ستبدأ تدريس كل مفهوم أو ظاهرة بتوضيح مدى أهمية ذلك المفهوم أو تلك الظاهرة في حياة الطالب وذلك لزيادة دافعيته.   ع. ستزيد من أسئلة الواجب.
و. أخرى: ...... (اكتبها).

Expectancy beliefs	ب. إلى أي مدى من (1-10) تعتقد بأن لديك القدرة على إعداد خطة لحصة دراسية على نحو متميز؟ ....

ج. هل تعتبر هذا النشاط على أنه: *(ضع دائرة حول أفضل رقم تراه مناسبا لكل الرموز من (أ – ث):*
Utility value, Attainment value, Intrinsic value, and Cost

أ. **غير مفيد** ----1----2----3----4----5----6----7----8----7----8----9----10---- **مفيد**
ب. **غير مهم**----1----2----3----4----5----6----7----8----7----8----9----10----**مهم**
ت. **غير مثير**----1----2----3----4----5----6----7----8----7----8----9----10---**مثير للاهتمام**
ث. **مكلف** ----1----2----3----4----5----6----7----8----7----8----9----10----**غير مكلف**

Activity 2: Teaching Skills (Taking Care of Differentiation): *Experimental group*

A. Description:

The researcher will provide a Facebook account for each participant with a nickname. Facebook will be accompanied with the YouTube application or with links of various educational online sites in order to display a variety of educational experts' opinions. The participants will interact with each other through this activity, which was designed according to the Gibb's Cycle model and Expectancy-Value theory, for one week.

B. Goals:

Teachers' point of view:

- Developing their skills in taking care of differentiation between students.

Researcher's point view:

- Developing science teachers' reflective practices and their motivation towards teaching (through utilising a reflective practices model, motivation theory, and a mobile application).

C. Rationale of using the Facebook application:

1- This application provides a secure identity for participants. Thus, it could be suitable for creating a discussion environment for male and female science teachers without violating any values of the community.

2- The Facebook application is one of the most well-known applications in social media and thus, some science teachers might be interested to learn how to utilise it, especially those who have never tried to use it previously.

3- Facebook offers the possibility of putting questions and steps into logical order.

4- Facebook could be used accompanied with other applications.

5- The availability of this application with Twitter could provide desirable diversities for the participants.

Version1 of Activity 2

Reflection Cycle: **Gibb's Cycle**

Mobile Application: Facebook

Time period: One week

Table 4.14: Version1 of Activity2 (Experimental group/Control group1)

A. To what extent (from 1-10) do you believe that you have the ability to manage differentiation between students? ....

1- What are your strategies for managing the differentiation between students?
    a. Implementing of collaborative learning.
    b. Diversity in teaching methods.
    c. Diversity in teaching tools.
    d. The logical sequence of the lesson.
    e. Focussing on making students as a centre of the educational process.
    f. Applying of education technology.
    g. Formulate questions that suit different abilities.
    h. Provides enrichment activities for excellent students.
    i. Other: .... (Please write answers).

2- To what extent (from 1-10) do you feel satisfied with managing differentiation between students? ....

3- What are the strategies that proved effective in managing the differentiation between students?
    a. Variation of teaching methods.
    b. Increasing amount of homework.
    c. Diversification of teaching tools.
    d. Taking care of continuous evaluation.
    e. Encouraging summarising lessons.
    f. Organizing Information: for example, employing the concept map.
    g. Taking the theory of multiple intelligences into account.
    h. Deal with students as the centre of the educational process.
    i. Other: .... (Please write answers).

4- Watch the following video or read the article below that show the strategies and opinions of some educational experts in dealing with differentiation between students.

5- After watching these videos, what are the new strategies (if existing) that you may follow in order to manage differentiation?
    ....

6- In general, what are your best strategies for managing the differentiation between students, and how will you apply them practically?
    ....

B. To what extent (from 1-10) do you believe that you have the ability to manage differentiation between students? ....

C. Do you consider this activity as: (Circle a number in each choices from a - d)

      a. Useful----10----9----8----7----8----7----6----5----4----3----2----1----Not useful.
      b. Important ----10----9----8----7----8----7----6----5----4----3----2----1---- Not important
      c. Interesting ----10----9----8----7----8----7----6----5----4----3----2----1---- Not interesting**.**
      d. Not costly ----10----9----8----7----8----7----6----5----4----3----2----1---- Costly.

The following chart shows the Gibb's Cycle model which the previous activity depends on in order to enhance teachers' reflective practices:

1- Description   **Gibbs's Cycle**

What are your strategies in taking care of differentiation?

To what extent (1-10) do you feel satisfied in taking care of differentiation between students......

6- Action Plan: **2- Feelings**

What is your action plan in order to implement your new strategies?

What are the strategies that proved effectiveness in taking care of differentiation between students?

3- Evaluation

What are your best strategies in taking care of differentiation between students for next lesson?

5- Conclusion:

After watching these videos, what are the new strategies (if existed) that you may follow in order to take care of differentiation?

4- Analysis:

Figure 4.11: Chart explaining how Gibb's Cycle model was applied in Activity2

Furthermore, the following chart is a reminder of the Expectancy-Value theory of which the previous activity depends on in order to enhance teachers' motivation towards teaching:
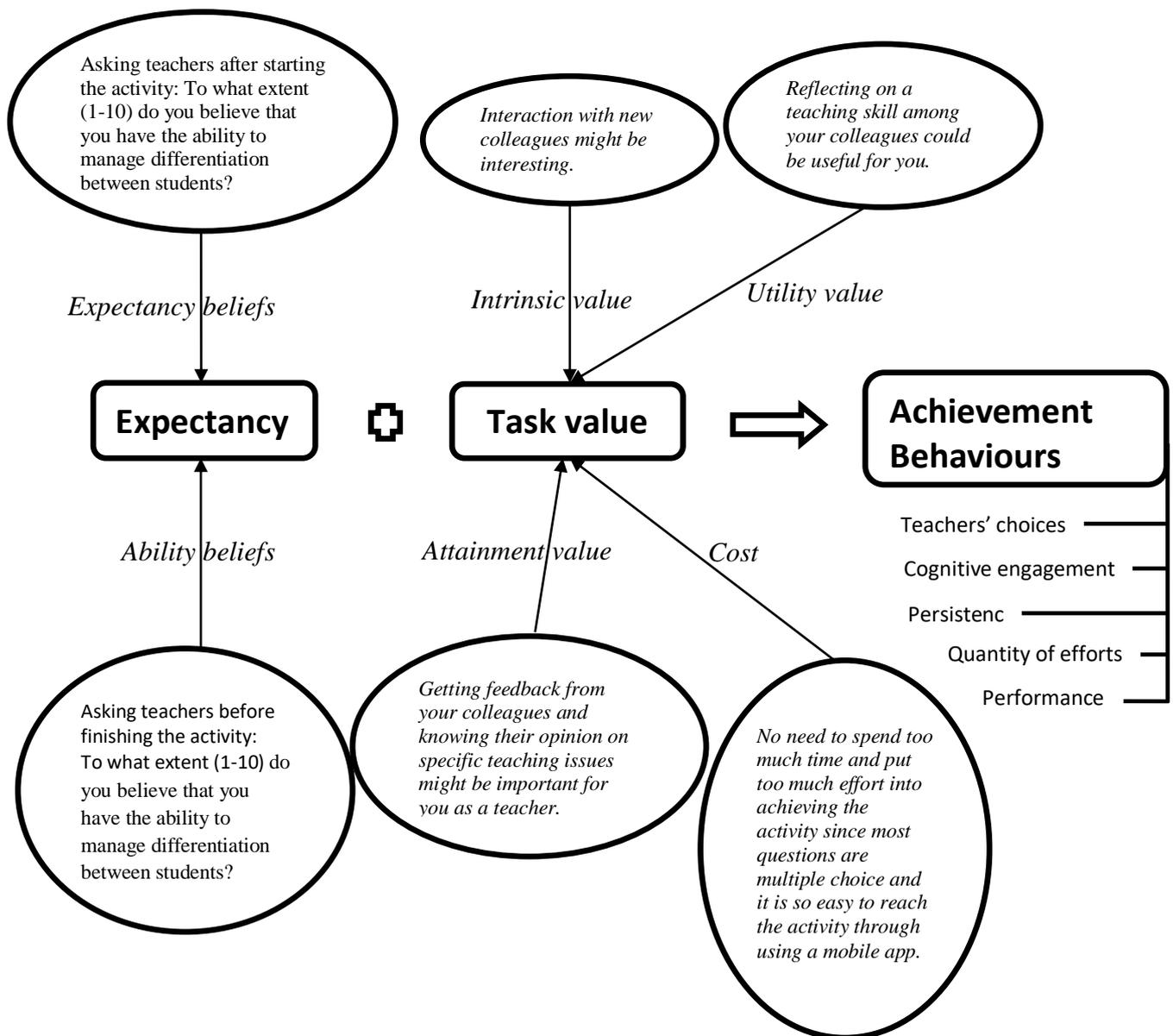
Figure 4.12: Chart explaining how the Expectancy–Value model was applied in Activity2

Version 2 of activity 2: Explanation of the relationship between adopted models or theories, and the questions of the activity

The comments (on the right side of the page) show how each question in the activity is related to the adopted models of reflective practices and motivation.

A. To what extent (1-10) do you believe that you have the ability to take care of differentiation between students? .... — Comment [U13]: Ability beliefs

1- What are your strategies in taking care of differentiation between students? (Multiple choices could be added). — Comment [U14]: Description

2- To what extent (1-10) do you feel satisfied in taking care of differentiation between students? .... — Comment [U15]: Feelings

3- What are the strategies that proved effectiveness in taking care of differentiation between students? (Multiple choices could be added). — Comment [U16]: Evaluation

4- Watch a few videos that show the strategies and opinions of some educational experts in dealing with differentiation between students.

5- After watching these videos, what are the new strategies (if existed) that you may follow in order to take care of differentiation? — Comment [U17]: Analysis

6- What are your best strategies in taking care of differentiation between students for next lesson? — Comment [U18]: Conclusion

.... and

What is your action plan in order to implement your new strategies? — Comment [U19]: Action Plan

B. To what extent (1-10) do you believe that you have the ability to take care of differentiation between students? .... — Comment [U20]: Expectancy beliefs

C. Do you consider this activity as: (Circle a number in each choices from a - g) — Comment [U21]: Task Value

a. Useful ----10----9----8----7----8----7----6----5----4----3----2----1----Not useful. — Comment [U22]: Utility value

c. Important ----10----9----8----7----8----7----6----5----4----3----2----1---- Not important — Comment [U23]: Attainment value

e. Costly ----10----9----8----7----8----7----6----5----4----3----2----1---- Not costly — Comment [U24]: Cost

g. Interesting ----10----9----8----7----8----7----6----5----4----3----2----1---- Not interesting. — Comment [U25]: Intrinsic value

Figure 4.13: Version 2 of Activity 2

Version 3 of activity 2: *Experimental Group*

The next screenshot shows how participants view the previous activity (in Arabic) by using Facebook.
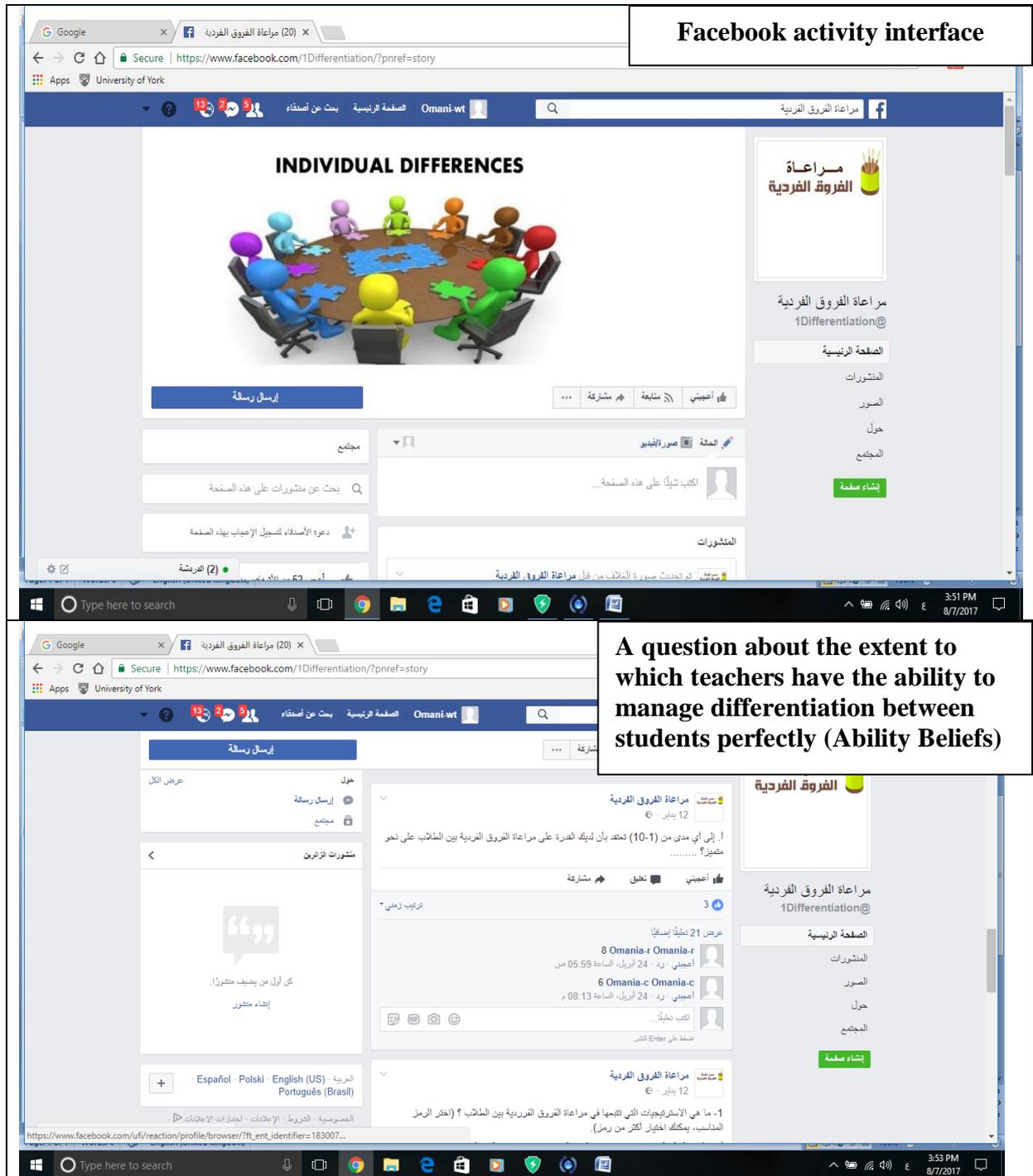
Figure 4.14: Version 3 of Activity 2 (Experimental group)

Note: To see more examples of of vesion3, see Appendix G, p.313.

Version 3 of Activity 2: Taking Care of Differentiation: *Control group1*

Below is an illustration of how Activity 2 was viewed by the participants of the control group1, who used the workbook.

<div dir="rtl">

النشاط رقم (1): مراعاة الفروق الفردية:

</div>

Table 4.15: Version3 of Activity2 (Control Group1)

<div dir="rtl">

أ. إلى أي مدى من (1-10) تعتقد بأن لديك القدرة على مراعاة الفروق الفردية بين الطلاب على نحو متميز؟ ...... Ability beliefs
1- ما هي الاستراتيجيات التي تتبعها في مراعاة الفروق الفردية بين الطلاب؟(ضع دائرة حول الرمز المناسب، يمكنك اختيار أكثر من رمز).   Description   أ. توظيف التعلم التعاوني ب. تنوع في طرق التدريس ج. تنوع في الوسائل التعليمية   د.التسلسل المنطقي للدرس ر. تركز على أن يكون الطالب محورا للعملية التعليمية ع. توظيف تكنولوجيا التعليم   ط. تصيغ أسئلة تناسب مختلف القدرات هـ. توفر أنشطة اثرائية للطلاب المتفوقين   و. أخرى: .... (اكتبها).
2- إلى أي مدى من (1-10) تشعر بالرضا من مستوى مراعاتك للفروق الفردية بين الطلاب؟ .... Feelings
3- ما الأساليب التي تستخدمها وتعتقد أنها أثبتت فعاليتها في مراعاة الفروق الفردية بين الطلاب؟ (ضع دائرة حول الرمز المناسب، يمكنك اختيار أكثر من رمز).   Evaluation   أ.تنويع طرق التدريس ب. زيادة عدد الواجبات ج. تنويع الوسائل التعليمية   د.الاهتمام بالتقويم المستمر ر. التشجيع على تلخيص الدرس ط. تنظيم المعرفة: مثلا توظيف خارطة المفاهيم.   هـ. أخذ نظرية الذكاءات المتعددة بعين ع. جعل الطالب محورا للعملية التعليمية. الاعتبار   و. أخرى: .... (اكتبها).
4- اقرأ النص المكتوب في الصفحة التالية والمرتبط برأي الخبراء والأدب التربوي بموضوع مراعاة الفروق الفردية.   (Read attached article)
5- بعد قرائتك للنص: ما الأساليب الجديدة (ان وجدت) والتي ترى أنه يمكن اتباعها في مراعاة الفروق الفردية بين الطلاب؟   Analysis ....
6- بشكل عام وبعد انتهائك من هذا النشاط: ما هي الاستراتيجيات والأساليب المثلى والتي تجدها الأفضل وستتبعهاعند مراعاتك للفروق الفردية بين الطلاب في حصصك المقبلة؟ حدد أسلوبين على الأقل.................... Conclusion   ما الأساليب الاجرائية التي ستتبعها لتطبيق الاستراتيجيات الجديدة ؟ ....…................... Action Plan
ب. إلى أي مدى من (1-10) تعتقد الآن بأن لديك القدرة على مراعاة الفروق الفردية بين الطلاب على نحو متميز؟ ....Expectancy beliefs
ج. هل تعتبر هذا النشاط على أنه: (ضع دائرة حول أفضل رقم تراه مناسبا لكل الرموز من (ج- د):   ج. **غير مفيد** -----1----2----3----4----5----6----7----8----7----8----9----10----**مفيد**   ح. **غير مهم**-----1----2----3----4----5----6----7----8----7----8----9----10----**مهم**   خ. **غير مثير**-----1----2----3----4----5----6----7----8----7----8----9----10----**مثير للاهتمام**   د. **مكلف** -----1----2----3----4----5----6----7----8----7----8----9----10----**غير مكلف**   Utility value, Attainment value, Intrinsic value, and Cost

</div>

4.5.4 Final list of activities of experimental group and its counterpart in control group1

The researcher chose 12 topics for the study intervention, based on his experience as an inspector for more than 14 years. It appears that some of these chosen topics might continuously affect issues of learning and teaching among some science teachers. However, the researcher relied on participants' opinions to edit this list. Eight participants were chosen to reflect on the list, and a few changes were made based on their opinion. On the other hand, the order of these activities is not a crucial factor since most of the participants are qualified science teachers and have basic knowledge about each of the chosen topics. The following table shows the final list of the activities of the experimental group and its counterpart in the control group1. Note: the third group (control group2) relied on a diary card in order to show the extent to which they utilise mobile applications in their efforts in teaching, learning and, developing their profession as science teachers.

Table 4.16: Final list of activities of Experimental Group

n	The Activities	The Themes	Mobile Applications	Frameworks
1	Teaching Skills: Individual differences	Improving teachers' ways of managing students' differentiation	Facebook + YouTube	Gibb's Cycle
2	Planning a Lesson	Reflecting on a lesson plan to improve planning skills	WhatsApp + Twitter	Kolb's Cycle
3	Teaching Skills: Cooperative Learning	Developing teachers' strategies in implementing cooperative learning	Facebook + YouTube	Gibb's Cycle
4	Planning a Lesson	Reflecting on a lesson plan to improve planning skills	Facebook + YouTube	Kolb's Cycle
5	Planning a Lesson	Reflecting on a lesson plan to improve planning skills	WhatsApp + Twitter	Kolb's Cycle
6	Reflecting on Teaching	Enhancing teaching skills of teachers by watching a video related to their implemented lesson	Camera + Facebook	Kolb's Cycle
7	Classroom Situations	Improving teachers' strategies with students who contribute little in discussions (low classroom interaction)	Facebook + YouTube	Gibb's Cycle
8	Planning a Lesson	Reflecting on a lesson plan to improve planning skills	WhatsApp + Twitter	Kolb's Cycle
9	Classroom Situations	Improving teachers' strategies with students who have difficulties in reading and writing.	Facebook + YouTube	Gibb's Cycle
10	Classroom Situations	Improving teachers' strategies with students who misbehave during the lesson	Facebook + YouTube	Gibb's Cycle
11	Teaching Skills: Classroom Management	Improving teachers' strategies in classroom management	Facebook + YouTube	Gibb's Cycle
12	Teaching Skills: Students' Motivation	Improving teachers' strategies in motivating students to learn	Facebook + YouTube	Gibb's Cycle

Chapter Five: Effects of the Intervention on Reflective Practices

Introduction

The study presents its findings over three chapters. This chapter reveals Omani science teachers' reflective practice levels, and the impact of the intervention of the study on their reflective practices. This is accomplished through the incorporation of various sources of data: interview data, baseline data, standardised measures data, and activities data. The chapter begins by showing the extent to which Omani science teachers are reflective by analysing the baseline data and the interview data. The baseline data were gathered from Omani science teachers who teach 10th Grade (n=150) by using a reflective practices instrument, and the interview data were gathered from 21 participants in the intervention of the study, which has overall total of 83 participants. Then, the second phase of the chapter explains the effect of the study intervention on Omani 10th Grade science teachers' reflective practices. To achieve this, evidence from the interview data, the standardised measures data, and the activities data, were utilised.

5.1 The extent to which Omani science teachers are reflective

Introduction

This section begins by clarifying the teachers' perspectives on reflective practice. It then shows (based on interview data and baseline data) their perceptions of the extent to which they are reflective teachers. Their perceptions regarding the previous issue are also presented, according to their gender, years of experience, and school location.

5.1.1 Teachers' perspectives on the reflective practice term

One of the main goals of the present study is to investigate the extent to which Omani science teachers practise reflection. The study's question regarding this aspect is: To what extent do science teachers in The North AL Batinah Region of the Sultanate of Oman practise reflection? As mentioned earlier, the study relies on analysing interview data and baseline data for the purpose of answering this question.

Before getting closer to determining the level of reflection among science teachers in Oman, it is important to know what is meant by the term 'reflective practices'. The findings of the pre-interview analysis show that the majority of informants (71 per cent) do not know

the specific meaning of reflective practices. For example, Omani-A$_5$ teacher from control group2 said: *"I have never heard about it during my 27 years of experience as a teacher"*, while Omani-om teacher from the experimental group indicated that this concept is *"not well-known during in-service training programmes or during discussion with inspectors"*. It must be noted that the coding system for the informants is as follows:

Table 5.1: The informants' coding system

N	Group	The coding system	
		Male	**Female**
1	Experimental group	Omani-(letters only)	Omania-(letters only)
2	Control group1	Omani-(numbers)	Omania-(numbers)
3	Control group2	Omani-(A$_{(4-5)}$)	Omania-(A$_{(1-3)}$)

Besides, the definition of reflective practices that was given by many of the informants is generally incompatible with the meaning that the literature addresses. For instance, Omani-i teacher defines reflective practices as *"Thinking about the teaching process"*, while Omani-tc teacher said *"I'm not sure; it might mean using your brain to create ideas"*. Another informant (Omani-lm) said: *"thinking about lessons and how to deal with students"*. Although the definitions given by these informants point to an important aspect of reflection, which is thinking, they do not fit with what is stated in the literature in that reflective practices are about *"examining one's own actions"* (Ahmad et al., 2013, p.74) in order *"to provide effective, applicable actions for strengthening performance"* (Impedovo and Malik, 2016, p.101). Only two informants (Omania-yt and Omania-wt), who are new teachers, were close to the definition. Omania-yt teacher defined reflective practice as *"a thinking process done by a teacher after implementing the lesson in order to improve her performance in teaching"*, while Omania-wt teacher defined it as *"a close view on an action in order to get a feedback and to reach the desired improvement"*.

In fact, I could not find any evidence that reflective practice, as a concept, exists in their daily work context. In general, they did not show any practical evidence that could refer to the availability of this concept in their conceptual framework since no informant mentioned that they had used any reflective tools, such as writing journals, peer observation, and video-audio recording.

5.1.2 The extent to which they are reflective teachers

Although most of the informants were not able to accurately define reflective practices, it seems that they are generally aware that it is a type of thinking processes in teaching, and therefore the majority of them (81 per cent) consider themselves as reflective teachers, which means that they *"think over their teaching practices, analyse how something was taught and how the practice might be improved or changed for better learning outcomes"* (Mathew et al., 2017, p.127). The following are quotations of illustrative extract from some of the informants who claimed that they are reflective teachers:

For instance, Omani-lm teacher said: *"I can say that I may sometimes think about how to make things correct during teaching"*. While Omani-tu teacher claimed that *"I always think about my actions and my practices as a teacher. For example, I learned from giving students examples that it is important to prepare questions that suit their levels and I have to be aware of every word in the sentence because this can change their way of understanding"*. Meanwhile, Omani-n teacher pointed out *"I think I do practice reflection but at a very low level. I just think about the lesson before implementing it but after that I don't reflect on anything at all"*. Furthermore, Omani-om teacher said: *"Yes, after the lesson, I reflect on how I implemented it and what my actions look like?"* Finally, Omania-yt said: *"after implementing a lesson, I start thinking about the negative and positive points in order to improve the next lessons"*.

These and other responses point to participants' beliefs that they are practising reflection in different forms: thinking about actions during teaching, thinking about lesson plans, and thinking about teaching after implementing the lessons. However, they did not mention any specific tools for these purposes and they differ in respect to the extent to which they think they are reflective teachers. Although 17 informants out of 21 claim that they are reflective teachers, the mean score of their responses to the question – "to what extent out of 10 do you think that you are a reflective teacher?" is 6.1 out of 10. Thus, according to the informants, they are at a medium level of reflective practice.

On the other hand, the baseline data gathered by the reflective practice instrument may support the interviews' findings which point out that Omani science teachers practice reflection at a medium level. The following table represents the mean and standard deviation of the participants' responses to the items of the instrument that was taken from Akbari et al. (2010, p.224):

Table 5.2: The mean and standard deviation of the instrument's items (reflective practice variable)

Component	N	Items	Mean	Standard Deviation
Practical	1	I have a file where I keep my accounts of my teaching for reviewing purposes.	4.07	0.96
	2	I talk about my classroom experiences with my colleagues and seek their advice/ feedback.	3.86	0.91
	3	After each lesson, I write about the accomplishments/ failures of that lesson or I talk about the lesson to a colleague.	2.86	0.98
	4	I discuss practical/theoretical issues with my colleagues.	3.91	0.88
	5	I observe other teachers' classrooms to learn about their efficient practices.	2.77	1.08
	6	I ask my peers to observe my teaching and comment on my teaching performance.	2.79	0.99
Mean			**3.38**	**0.61**
Cognitive	7	I read books/articles related to effective teaching to improve my classroom performance.	3.44	0.95
	8	I participate in workshops/conferences related to teaching/learning issues.	2.71	0.94
	9	I think of writing articles based on my classroom experiences.	2.04	0.97
	10	I look at journal articles or search the internet to see what the recent developments in my profession are.	3.24	0.98
	11	I carry out small scale research activities in my classes to become better informed of learning /teaching processes.	3.20	4.41
	12	I think of classroom events as potential research topics and think of finding a method for investigating them.	3.12	0.95
Mean			**2.96**	**0.98**
Learner	13	I talk to my students to learn about their learning styles and preferences.	3.84	0.89
	14	I talk to my students to learn about their family backgrounds, hobbies, interests and abilities.	3.31	1.00
	15	I ask my students whether they like a teaching task or not.	3.39	1.01
Mean			**3.51**	**0.76**
Metacognitive	16	As a teacher, I think about my teaching philosophy and the way it is affecting my teaching.	3.59	0.95
	17	I think of the ways my biography or my background affects the way I define myself as a teacher.	3.47	1.05
	18	I think of the meaning or significance of my job as a teacher.	4.05	0.94
	19	I try to find out which aspects of my teaching provide me with a sense of satisfaction.	4.27	0.82
	20	I think about my strengths and weaknesses as a teacher.	4.33	0.77
	21	I think of the positive/negative role models I have had as a student and the way they have affected me in my practice.	3.71	0.86
	22	I think of inconsistencies and contradictions that occur in my classroom practice.	3.60	0.84

			3.86	0.59
Mean				
Critical	23	I think about instances of social injustice in my own surroundings and try to discuss them in my classes.	2.83	1.03
	24	I think of ways to enable my students to change their social lives in fighting poverty, discrimination, and gender bias.	3.24	1.10
	25	In my teaching, I include less-discussed topics, such as old age, AIDS, discrimination against women and minorities, and poverty.	2.88	1.08
	26	I think about the political aspects of my teaching and the way I may affect my students' political views.	2.41	1.10
	27	I think of ways through which I can promote tolerance and democracy in my classes and in the society in general.	3.61	1.04
	28	I think about the ways gender, social class, and race influence my students' achievements.	2.70	1.28
	29	I think of outside social events that can influence my teaching inside the class.	3.04	1.08
Mean			2.96	0.74
Mean of the instrument items			3.32	0.49

The previous table shows that the mean of the instrument items equals 3.32, which clearly underpins the interviews' findings that Omani science teachers' reflective practices are at the medium level, according to a five-point Likert scale. In addition, the table shows that the means of the instrument components are generally at the medium level, according to a five-point Likert scale too, and are ranked as per the following table:

Table 5.3: Reflective Practice Instrument Components

Ranking list	The components	The Mean
1	Metacognitive	3.86
2	Learner	3.51
3	Practical	3.38
4	Critical	2.96
5	Cognitive	2.96

Table 5.3 shows that meta-cognitive component (M=3.86) is the highest component with Omani science teachers. The second highest component is the learner component (M=3.51). Table 5.3 also indicates that the mean of the practical component is not high (M=3.38), and there is a big difference between the mean of the meta-cognitive component (M=3.86) and both critical components (M=2.96), and the cognitive component (M=2.96) equals (0.90). In order to identify the meaning of reflective practice components, see Chapter Three, section 3.1.5.1, p.97.

According to the interview evidence, it can be claimed that informants' meta-cognitive levels are high, since most of the interviewees have referred to some aspects of this component in one form or another. There is a lot of evidence to underpin this claim. For example, Omani-tc teacher said, in response to the question relating to the factors that help teachers to be reflective, *"It depends on the aim of a teacher from being a teacher, do they have an enough motivation and desire to be a good teacher?"*, while Omania-f replied to the same question, as follows *"the desire, the ambition in excellence and to reach satisfaction about themselves"*. In addition, during speaking about the importance of reflection, Omani-lm teacher stated: *"it helps to choose the right decisions for solving problems, it helps to avoid making mistakes, it improves the quality of teaching, it improves the high thinking levels, it develops teacher's self-confidence and it helps in connecting topics together"*. While Omania-yt pointed out that reflective practices are important to *"determine the weak and the strong points in the teacher's performance in order to improve it"*. Another teacher (Omani-om) said: *"I reflect to avoid making mistakes again and to review my reactions on students' behaviours"* which may refer to the importance that he gives to his personality and to his behaviours as a teacher during interacting with learners. In fact, all these previous responses indicate that participants have a vision of themselves as teachers, and they focus on how to develop their teaching abilities.

In terms of the learner component, the interview evidence indicates that there is an interest among Omani science teachers to understand the extent to which learners achieve classroom objectives. In addition, some informants gave signals that they attempt to understand students' knowledge. For instance, Omani-A$_5$ teacher said: *"I try my best to achieve the goals of lessons in order to feel that my students have learned and they are happy with my way of teaching.* While, Omani-lm teacher said: *"reflective practices are essential for the purpose of understanding students' ideas and knowledge, knowing how to plan well, and how to motivate students to learn"*. Besides, Omania-A$_2$ teacher described reflective practices as an important factor for a teacher to *"gain experience in dealing with students"*. Further, Omani-n stated: *"I practice reflection to be successful as a science teacher. I'm very keen to get good comments from my students about my teaching. I feel satisfied if they say everything in the lesson was clear"*. So, we may contend that Omani science teachers draw attention towards learners and their knowledge.

In contrast, there is no evidence that the informants care about the practical component. As mentioned earlier, they did not mention any tools for practising reflection.

Further, there is much interview evidence that refers to the lack of interest in teachers' cognitive components of reflection. They gave excuses regarding their deficiencies in reading and professional development. For instance, Omani-19 said:

> "I think the time is the main factor for reflection. How it is possible for a teacher to reflect if he couldn't find time to do so. Usually, teachers do not have time to reflect, especially, if there is a pressure of having too many teaching hours per week. If you entered a classroom you will find yourself quickly in the other classroom without a period for reflection".

This may point out that science teachers do not have sufficient time to concentrate on reflection, which is a vital basis of their professional development. Another teacher (Omania-l) complains from the multiplicity of curricula that she teaches. She said: *"There is no time to read, I need to prepare lessons for three curricula".* Thus, it seems that teachers who have many curricula or many lessons to teach do not focus on the cognitive component. In fact, Omania-l teacher and six of her colleagues indicated that they do not have time to read from literature.

Finally, I could not find any signs in the interview data regarding the critical component. The informants did not mention this dimension at all. This may support the instrument findings that this component is not one of the teachers' basic practices.

5.1.3 The comparison of teachers' reflective practice levels according to their gender, school location, and years of experience

In order to compare the mean reflective practice scores of teachers according to their gender, school location, and years of experience, the researcher first conducted the normality test for the pre-test data provided by the reflective practice instrument. He found that the data were normally distributed. Thus, the decision to apply parametric tests for analysing these data was made.

a. Gender

The independent t-test was carried out in order to identify whether the difference in the mean reflective practice scores between male and female teachers is statistically significant. The results show that Omani female science teachers' reflective practices levels (M=3.41, SD=0.48) are higher than Omani male science teachers (M=3.22, SD=0.48), and this pattern is statistically significant t (148) = 2.36, *p*=0.02. This means Omani female science teachers practise reflection more than male teachers.

b. School location

The independent t-test was carried out again in order to identify whether the difference in the mean reflective practice scores between teachers at urban schools and teachers at rural schools is statistically significant. The result of the independent t test was not statistically significant t (148) = 1.64, p=0.10. This means that school location does not affect teachers' reflective practices significantly.

c. Years of experience

Furthermore, a one-way ANOVA test was carried out in order to identify whether the difference in the mean reflective practice scores between teachers based on their years of experiences is statistically significant. The independent variable, teachers' years of experience, included three groups: short period, medium period, and long period. The results show that ANOVA was not significant, F (2, 147) = 0.40, p=0.67, η^2=0.01. This means that teachers' reflective practice levels are not associated with their teaching experience.

In fact, the reflective practices' instrument results indicate that reflective practices of Omani female science teachers overcome those practices of the Omani male science teachers within all types of strata. It seems that the best stratum in practising reflection is the stratum of Omani female science teachers who teach at urban schools and have long years of experience. Further, it seems that the worst stratum in practising reflection is the stratum of Omani male science teachers who teach at urban schools and have short years of experience. The following two graphs summarise the results of all strata and support these claims:

Figure 5.1: Mean of teachers' reflective practices of all strata

Conclusion

In conclusion, Omani science teachers who teach 10th Grade classes practise reflection at a medium level, according to a five-point Likert scale. The highest components of reflective practices are the metacognitive and learner components. Besides, the difference in the mean reflective practice scores between Omani male science teachers and Omani female science teachers is statistically significant in favour of Omani female science teachers. However, there is no statistically significant difference in the mean reflective practice scores between Omani science teachers according to their years of experiences or their school location. Finally, the best stratum in practising reflection is the stratum of Omani female science teachers who teach at urban schools and have long years of experience. Further, the worst stratum in practising reflection is the stratum of Omani male science teachers who teach at urban schools and have short years of experience.

5.2 Effects of the intervention on teachers' reflective practices

Introduction

This study reveals the impact of its intervention on Omani science teachers' reflective practices through the incorporation of various sources of data: interview data, standardised measures data, and activities data. During this phase, these data were combined together to form a clear picture regarding any changes in teachers' reflective practices. The process of finding evidence starts with analysing the interview data. Then, the standardised measures data and the participants' activities were analysed.

5.2.1 Evidence from interview data

Before revealing the impact of the training programmes on the three groups (using mobile applications, using workbook, using diary cards), we must first mention the main objectives of these different programmes. One of the main goals of these programmes is to contribute to the development of teachers' reflective practices. The development of these types of practice is an important goal for those working in the field of education. Mathew et al. (2017) argue that the reflective practice process, where individuals' reliance on learning by recalling their past experiences, rather than relying on formal theoretical learning, is an important tool to test the values system of teachers and to support their professional development. Thus, these programmes are an attempt towards this direction. The following findings illustrate the views of the targeted teachers on the impact of these programmes on their reflective practices, and which of them are the most useful in regard of enhancing reflective practices. The informants of all the three groups gave various appraisals about the impact of the type of training that they have engaged with. The following discussion begins with determining the positive, neutral and negative appraisal of all three training platforms. Then, a deeper discussion takes place to illustrate how the use of the mobile applications and the workbook as a training platform impacts teachers' reflective practices.

5.2.1.1 Tracing teachers' appraisal of using the three training platforms

Introduction

This section addresses teachers' perspectives about the training platforms and activities. It begins with experimental group opinions. It then shows the opinions of both control group1 and control group2.

1- **Experimental group opinions**

The following table shows a summary of the participants' appraisal of training platforms using mobile applications with a specific programme.

Table 5.4: A summary for the experimental group participants' appraisal of their training programme

The type of appraisal	No of references	Sample contents
Positive	19	Useful experiment, understanding some teaching skills better than before, understanding my level in teaching and planning compared to my colleagues, understand students more, thinking more about students' needs, ready plans gave me more time to reflect and search, increased my reflective practices, improved ways of planning a lesson, improved my teaching methods, evaluate my teaching skills.
Neutral	0	-
Negative	1	I still find difficulties in improving some of my teaching skills.

The table reveals the opinions of participants of the experimental group on the activities, and the use of mobile applications as a training platform. As shown in the table, the majority of them describe it as a useful programme, which had a positive impact on their reflective practices. In fact, seven of the experimental group participants mentioned that using mobile applications as a training platform increased their reflective practices. For instance, Omania-j teacher claimed that the programme increased his level of reflective practices to reach nine out of ten. While, Omani-i teacher claimed that his reflection level became higher than before. Another teacher said: *"my reflection on my teaching skills became better"* (Omani-om teacher). Other teachers argue that this programme that employs mobile applications was very useful in many different ways. Yet, one of them mentioned that he did not gain any benefit from the programme regarding improving his reflective practices. The following quotes illustrate the opinions of the experimental group about the impact of their training programme. Omania-yt, a new female teacher at an urban school, said:

> *"Giving me some examples of ready-made lesson plans helped in comparing my lesson plans with others. I was very keen to see my colleagues' opinions and comments on the given lesson plans on Twitter. This helped me to understand how they think and what the differences between me and some of my colleagues are. In addition, the activities about teaching skills helped me a lot in evaluating my skills as a teacher".*

It seems that this new female teacher argues that both applications (Facebook and Twitter) were useful regarding evaluating her teaching skills and improving her reflective practices. This is because the readymade plans were acquired through Twitter, while the

teaching skills activities were provided by Facebook. Another teacher (Omani-n), with 19 years of experience, who teaches at an urban school, said: *"Ready-made lesson plans gave me the time needed for reflecting on the topics and preparing them mentally. Thus, the activity of planning lessons on Twitter has increased my reflective practice"*. This informant argues that the Twitter activities were the reason for his increase in reflective practices, since these activities included ready-made lesson plans which gave him enough time to reflect.

The capability of the experimental group programme to provide time for reflection may be an important and worthwhile point. It shows one of the affordances that could be expected from a programme that employs mobile applications. It is true that the ready-made lesson plans were also offered to control group1. However, it should be noted that there is a fundamental difference between them. This difference contributed in providing the time needed for reflection for this teacher in the experimental group. In fact, these lesson plans were in the hands of this teacher from the experimental group most of the time. He could see them whenever he wanted to. This was not available for any teacher in the control group1. Omani-lm teacher, who has 27 years of experience and teaches at a rural school, said: *"A positive development has been noticed and the impact of that can be seen in my teaching practices. I can say now I have changed some of my teaching methods and I try to listen more to students rather than making quick decisions about their bad behaviour"*. This informant claims that his reflection practices led him to change some of his teaching methods, as well as how to deal with his students. Omania-wt who teaches, at an urban school with short years of experience, stated: *"The programme helped me to take into consideration students' needs which play an essential role in understanding and solving any issues that might face me with them"*. This teacher acknowledged after reflecting that students' needs could be a key factor to deal with students' issues. Omania-f teacher, who has five years of experience as a teacher and teaches at an urban school, mentioned that there is an improvement in her reflective practices, and using Facebook and Twitter was the reason behind that. She said: *"Yes, the activities were useful but being part of the Facebook society or Twitter society was the source of effectiveness"*. Finally, Omani-tc teacher stated:

"Participating in the programme gave me new ideas about how to deal with some classroom situations, such as dealing with differentiation between students. I realised that I need to learn more about some teaching skills concepts. I started thinking that some of my previous classroom actions were wrong".

It is possible to say that this teacher is a good example of what this programme could achieve regarding promoting teachers' reflective practices. He pointed out that the programme helped him to realise that he needs to learn more about teaching skills, and to review his previous teaching actions. The following table shows positive key points raised from the quotes regarding the training programme of the experimental group.

Table 5.5: Positive key points raised from quotes (Experimental group)

n	Key points	The application
1	Increasing levels of reflective practices	Facebook & Twitter
2	Comparing lessons plans with others	Twitter
3	Seeing colleagues' opinions and their comments	Facebook & Twitter
4	Understanding how colleagues' think	Facebook & Twitter
5	Evaluating teaching and planning abilities and compare them with colleagues	Facebook & Twitter
6	Changing some teaching methods	Facebook & Twitter
7	Providing the needed time for reflection	Twitter
8	Listening more to students	Facebook
9	Having new ideas about how to deal with some classroom situations	Facebook
10	Realising the need to learn more about teaching skills	Facebook & Twitter
11	Reviewing previous classroom actions	Facebook

Conclusion

According to some of the experimental group participants, both applications (Twitter and Facebook) helped them to improve their reflective practices and evaluate their teaching and planning abilities. The Twitter activities (with ready-made lesson plans) were helpful in creating a suitable environment for reflection through reducing the effort and time needed for planning, since teachers' duties were only to reflect on these plans and compare their views with their colleagues' views. These activities also gave teachers the needed time for reflection. Thus, ready-made plans allowed teachers to compare how they plan with the rest of their colleagues, and they provided them with the time needed for that. Furthermore, Facebook activities were also useful in reviewing some of teachers' classroom behaviours and teaching methods, and in realising the need to learn more about teaching skills.

2- **Control group1 opinions**

Positive opinions about the programme in the case of the control group1 were fewer than the experimental group. The following table presents a summary of the participants' appraisal of training platforms using workbooks.

Table 5.6: A summary for the control group1 participants' appraisal of their programme

The type of appraisal	No of references	Sample contents
Positive	5	Useful workbook, reminding us of some teaching skills, increased my reflective practices.
Neutral	1	I don't know if there is a change in my reflection after participating in this experiment.
Negative	2	No effect on my reflective practices level.

As shown in the table above, five references describe this programme as useful with a positive impact on their reflective practices, while two informants felt that the programme had no effect in enhancing participants' reflective practice levels. One informant was not sure if that programme had an impact on his reflective practice levels. It can be noted that there is a difference of 14 references between the two groups (experimental and control group1). This leads to the assumption that the influences of the experimental group programme regarding improving teachers' reflective practices are more than the influences of the control group1 programme.

The following quotes illustrate the opinions of the participants in control group1 about the impact of their training programme. Omani-19 teacher, who teaches at an urban school, claims that the benefit of the programme was that it reminded him of his various teaching skills. He said: *"I think the workbook was useful, especially in reminding us of many teaching skills that were being ignored by us"*. Omania-4 teacher said: *"It has changed my level of reflective practice slightly"*. However, another participant in the same group said: *"...the workbook was useful, but I don't know if there is a change in my reflection after participating in this experiment"* (Omani-20 teacher). This teacher did not see any influence of the programme on his reflective practice levels. Omani-11 stated: *"I think that the programme in the workbook might be useful for new teachers. I believe that the activities of teaching skills are useful too, but I think the number of the activities has to be reduced"*. This teacher argues that the programme suits new teachers more. Based on his point view, it seems that the activities were not so interesting. Finally, Omania-5 teacher supported the opinion of Omani-11, stating: *"I think this programme is useful for new teachers"*.

Table 5.7: Positive key points raised from quotes (Control group1)

n	Key points
1	Increasing levels of reflective practices.
2	Useful in reminding participants of teaching skills.
3	Useful for new teachers.

Unlike the previous programme (using mobile apps), the participants of this programme (using workbook) did not think that this programme helped them to compare their lesson plans with their colleagues, or evaluate their teaching and planning abilities and compare with colleagues. None of them mentioned that the programme provided them with the needed time for reflection or helped them in reviewing the previous classroom actions.

Conclusion

The previous various responses of control group1 informants reveal that despite thinking that it is a useful programme, they are not very enthusiastic about it. Some of them suggested offering the programme to new teachers and some of them could not see any influence of the programme on their reflective practice levels.

3- **Control group2 opinions**

Control group2 was encouraged to use mobile applications without offering them a specific programme. They were asked to report on any employment of mobile applications (for the purpose of developing their profession as teachers) on diary cards. All of the informants in this group mentioned that there is no positive impact of this programme regarding their reflective practices. The following table presents a summary of the participants' appraisals of training platforms using mobile applications without a specific programme.

Table 5.8: A summary for the control group2 participants' appraisal of their programme

The type of appraisal	No of references	Contents
Positive	0	-
Neutral	1	I don't know if there is a change in my reflection.
Negative	5	Not effective on enhancing reflective practice levels.

The table above shows that there is no positive influence of control group2's programme on them. It seems that we should not expect any positive impact on teachers' reflective practices solely due to the use of mobile apps. A specific programme is needed for

that purpose. The following quotes show the opinions of the participants of the control group2 about the impact of their training programme. For instance, Omania-A$_2$ argued that having the diary card encouraged her to think about the affordances of mobile applications. She said: "*It encouraged me to focus on the importance of employing mobile applications but, it had no impact on my reflective practice levels*". Another participant stated: "*I just felt that it is important to use some of the mobile applications, but I don't know if this has any effect on my reflection*". In conclusion, it is clear that the participants of this group did not notice any improvement in their reflective practice levels. However, it did alert them to the possibility that mobile apps have something to offer them as teachers.

Conclusion

Comparing the responses of all groups (experimental group, control group1, and control group2) may lead us to conclude that the positive impact of using mobile applications as a training platform on science teachers' reflective practices is significantly better than its counterpart in control group1 and control group2.

5.2.2 Evidence from standardised measures data

The question that guides the study about the influence of the intervention on teachers' reflective practices is: What is the impact of using mobile technology as a training platform on science teachers' reflective practices? As previously mentioned in the methodology chapter, it was decided that parametric methods should be applied if the data are found to be normally distributed, and non-parametric methods applied if the data are found to be not normally distributed.

5.2.2.1 Normality Test

Shapiro and Wilk developed a test for normality that could be considered as the *"most powerful test in most situations"* (Hintze, 2011, p.4). According to Ghasemi and Zahediasl (2012), this test is the best choice among researchers in order to test normality. They point out that it is time to avoid using the Kolmogorov- Smirnov test (the most popular test for normality) due to its low power. The normality test (Shapiro and Wilk test) was conducted on the pre-test responses of the Omani science teachers who participated in the main study. The researcher found that data were normally distributed. The following results show first the normality test results:

Table 5.9: Tests of Normality

	Shapiro-Wilk		
Pre-test- reflective practice	Statistic	df	Sig.
	0.972	83	0.063

The Shapiro-Wilk test revealed that *p*-value equals 0.063 which is higher than 0.05. Thus, the null hypothesis was accepted and the data were considered to be normally distributed.
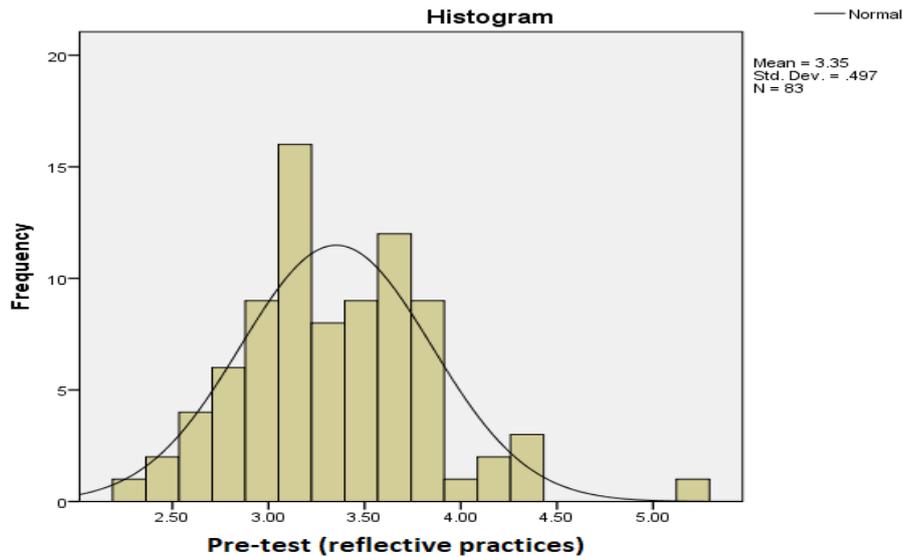
Figure 5.2: Histogram of pre-test

Furthermore, the histogram chart above confirmed the normality with its peak in the middle and approximately symmetrical.
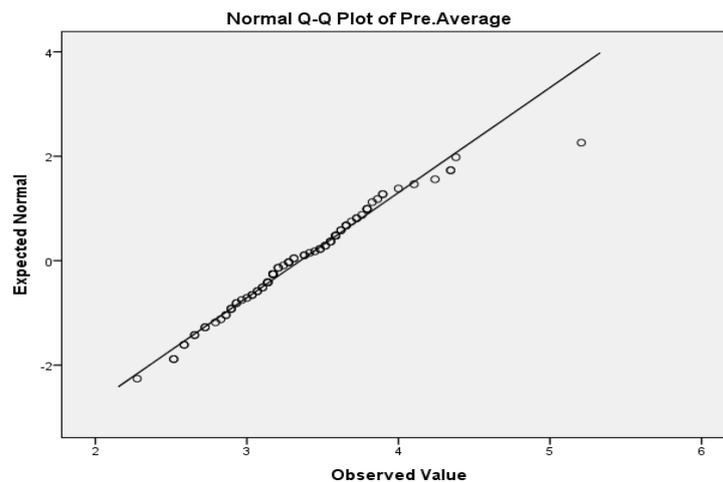
Figure 5.3: Normal Q-Q Plot

In addition, according to the normal Q-Q Plot as shown above, the points are mostly near to the diagonal line. Therefore, these data are clearly normally distributed. Table (5.10) below presents the mean and the standard deviation of all items of the instrument that measures the reflective practice variable according to groups (using mobile apps, using workbooks, and using diary cards) and time (pre-test and post-test):

Table 5.10: Mean and the Standard Deviation for the Pre-test and Post-test of all Items of the Instrument

	Group	Mean	Std. Deviation	N
Pre-reflective practice test of all instrument items	Using Mobile Apps	3.31	0.47	28
	Using Workbook	3.44	0.46	26
	Using Diary Cards	3.32	0.56	29
	Total	3.35	0.50	83
Post- reflective practice test of all instrument items	Using Mobile Apps	3.47	0.48	28
	Using Workbook	3.43	0.48	26
	Using Diary Cards	3.31	0.47	29
	Total	3.40	0.47	83

Based on the above table, the mean of the group that was using mobile applications increased from (M=3.31) to (M=3.47) but is barely the same in the rest of the groups. In summary, the results show that the enhancement of teachers' reflective practice levels occurred only (could not be statistically significant) with those who have employed mobile applications as a platform. The following graph clarifies this:
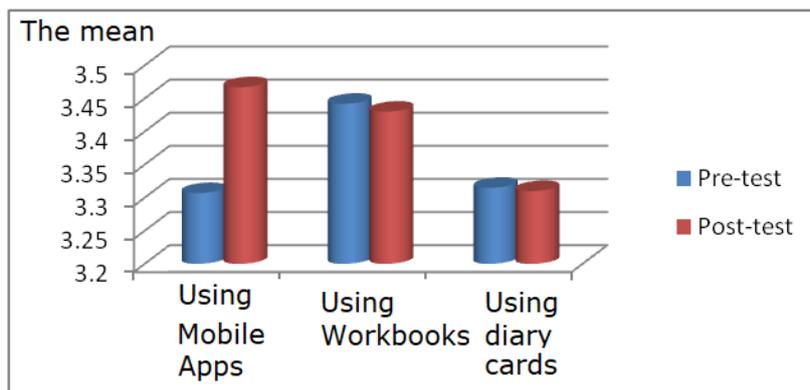
Figure 5.4: Pre-test and post-test scores for the three groups of the study (all items of the instrument)

Standardised measures data

Since that data were normally distributed, the decision to apply parametric tests for analysing these data was made. A two-way repeated measures analysis of variance (two-way ANOVA) test was chosen to examine the extent of interaction between the independent variable or one between-subjects factor (condition: mobile applications, workbooks, and diary cards) and the within-subject factor (time: pre-test and post-test) may influence scores on the dependent variable: teachers' reflective practices (Dimitrov and Rumrill, 2003; Howitt, and Cramer, 2014). According to Dimitrov and Rumrill (2003), relying on the F value for the between-subjects factor (Group) in order to test the treatment's main effect is a common mistake with many researchers. They argue that we have only to rely on the interaction F value (Group x Time) since the pre-test scores are not influenced by the treatment.

It was found that the interaction effect between one between-subjects factor (condition: mobile applications, workbooks and diary cards) and the within-subject factor (time: pre and post) *F*-test was 1.07 with a *p*-value of 0.35.

For more details, the multivariate model presents the findings of the two-way ANOVA test in such a way that for each variable or interaction effect, four different versions of the F-test are presented (Kremelberg, 2011). However, before employing this model we need first to see the Box's M in the Box's Test of Equality of Covariance Matrices (see, Kremelberg, 2011, p.177) that is not significant; (*p*=0.076) which is greater than the significance level (*p*=0.05).

Table 5.11: Box's Test of Equality of Covariance Matrices

Box's M	11.86
F	1.90
df1	6
df2	150680.99
Sig.	0.076

This means that the assumptions of the multivariate model have not been violated and this model could be used (Kremelberg, 2011). Wilks' lambda F-test is the multivariate statistic which is widely used. The table (5.12) shows Group X time interaction effect:

Table 5.12: Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time x Group							
	Wilks' Lambda	0.97	1.07	2.00	80.00	0.35	0.026

This means that the interaction between scores of teachers on pre-tests and post-tests, between teachers who joined in the mobile application training platform or who joined the other training platforms, is not significant. The Wilks' lambda F-test was 1.07 with a *p*-value of 0.35. Thus, the growth over time in science teachers' reflective practices did not differ in any group, or in other words, the growth in reflective practice levels of teachers who participated in the mobile applications training platform was not higher than those teachers who participated in the other forms of training platforms (Kremelberg, 2011).

As a conclusion, teachers' reflective practice levels were not significantly affected by the type of training platform used (mobile application, workbook and diary cards).

A two-way ANOVA test for reflective practices' components

Further investigations were carried out for the purpose of comparing the pre- and post-test mean of the instrument components using the two-way ANOVA test. Meanwhile, Table (5.13) below shows the descriptive statistics results for all instrument components:

Table 5.13: Comparing pre-test and post-test mean of the instrument's components

Components	Pre-test/Post-test	Using Mobile Apps		Using Workbooks		Using diary cards	
		M	SD	M	SD	M	SD
Practical	Pre-test	3.28	0.68	3.35	0.57	3.43	0.60
	Post-test	3.64	0.45	3.42	0.50	3.55	1.04
Cognitive	Pre-test	2.86	0.63	3.01	0.50	3.18	1.89
	Post-test	3.00	0.80	3.12	0.70	2.93	0.68
Learner	Pre-test	3.66	0.63	3.73	0.82	3.23	0.69
	Post-test	3.73	0.84	3.7182	0.83	3.30	0.54
Metacognitive	Pre-test	4.00	0.51	3.87	0.64	3.81	0.49
	Post-test	4.13	0.46	3.99	0.54	3.99	1.16
Critical	Pre-test	2.90	0.71	3.39	0.68	2.91	0.83
	Post-test	2.91	0.74	3.05	0.97	2.77	0.75
Mean total	Pre-test	3.31	0.47	3.44	0.46	3.32	0.56
	Post-test	3.47	0.48	3.43	0.48	3.31	0.47

The mean of the post-test of all components in the case of using mobile applications is higher than its counterpart in the pre-test. Thus, there is, in general, an improvement in all of the instrument's components that assessed the reflective practices of teachers when employing mobile applications. Yet, there is an improvement in the case of control group1 and control group2, but not in all the instrument's components, only in the practical and metacognition components. All these differences are not statistically significant as the following two-way ANOVA tests reveal:

Practical component

The Box's M in the Box's Test of Equality of Covariance Matrices is significant; (p=0.001) which is less than (p=0.05).

Table 5.14: Box's Test of Equality of Covariance Matrices (Practical component)

Box's M	39.86
F	6.40
df1	6
df2	150680.99
Sig.	0.001

This means that assumptions of the multivariate model have been violated and this model could not be used (Kremelberg, 2011). In this case, another model has to be used which is the univariate model that is shown in the table below. Since there are only two conditions (pre-test and post-test), then the assumptions of the univariate model were not violated and this model can be used (Field, 2012).

Table 5.15: UnivariateTests (Practical component)

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time x Group	Sphericity Assumed	0.71	2	0.35	1.07	0.35	0.026

In terms of Group (training platform) X time interaction effect, the Wilks' lambda F-test is 1.07 with a *p*-value of 0.35, which leads to conclude that there is not any significant effect of the training platform on this component of reflective practice.
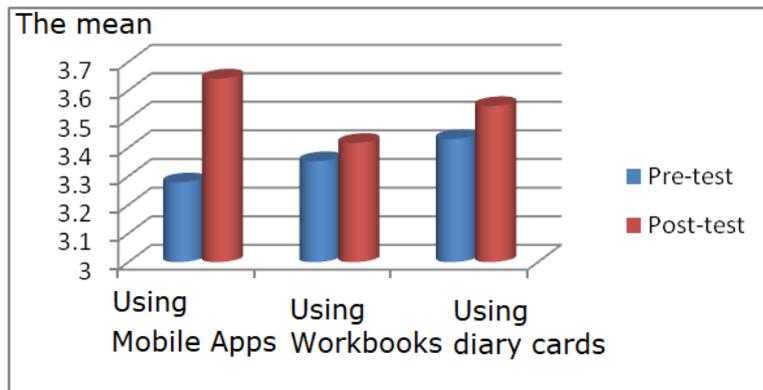
Figure 5.5: Pre-test and post-test scores for the three groups (practical component)

Cognitive component

The Box's M in the Box's Test of Equality of Covariance Matrices is significant; (*p*=0.001) which is less than (*p*=0.05). This means that assumptions of the multivariate model have been violated and this model could not be used (Kremelberg, 2011). The other model (univariate model) shown in the table below could be used since the assumptions of that model were not violated.

Table 5.16: Univariate Tests (Cognitive component)

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time x Group	Sphericity Assumed	1.43	2	0.71	1.01	0.37	0.025

Regarding Group (training platform) X time interaction effect, the Wilks' lambda F-test is 1.01 with a *p*-value of 0.37, which leads to conclude that there is not any significant effect of training platform on this component of reflective practice.
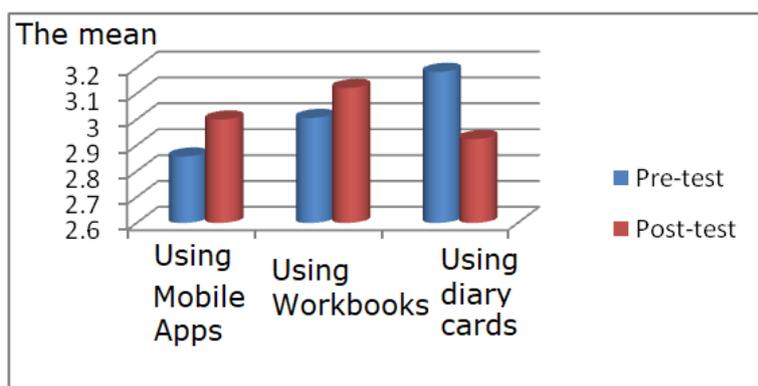
Figure 5.6: Pre-test and post-test scores for the three groups (cognitive component)

Learner component

Since the Box's M in the Box's Test of Equality of Covariance Matrices is not significant; (p=0.26) which is greater than (p=0.05), thus, the assumptions of the multivariate model have been not violated and this model could be used (Kremelberg, 2011). The table below indicates that in regard of Group X time interaction effect, the Wilks' lambda F-test was 0.11 with a p value of 0.90.

Table 5.17: Multivariate Tests (Learner component)

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time x Group	Wilks' Lambda	1.00	0.11	2.00	80.00	0.90	0.003

The multivariate tests reveals that the effect of time on the type of training platform on test scores did not vary significantly which means that the growth over time in learner component of the reflective practices instrument did not differ in any group, Wilks' lambda F-test=0.11, p=0.90, η^2=0.003 (Kremelberg, 2011).
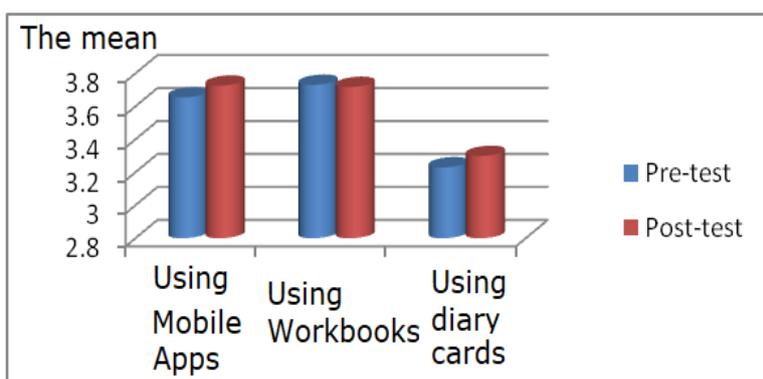
Figure 5.7: Pre-test and post-test scores for the three groups (learner component)

Metacognitive component

The Box's M in the Box's Test of Equality of Covariance Matrices is significant, (p=0.001) which is less than (p=0.05). This means that assumptions of the multivariate model have been violated and this model could not be used (Kremelberg, 2011). In that case, a univariate model shown in the table below could be used since there are only two conditions (pre-test and post-test) (Field, 2012) and thus the assumptions of the univariate model were not violated.

Table 5.18: UnivariateTests (Metacognitive component)

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time x Group	Sphericity Assumed	0.03	2	0.01	0.04	0.97	0.001

The table shows that the Time x Group interaction effect was found not significant, F=0.04, p=0.97, η2=0.001. This means that there is not any significant effect of the training platform on this component of reflective practice.
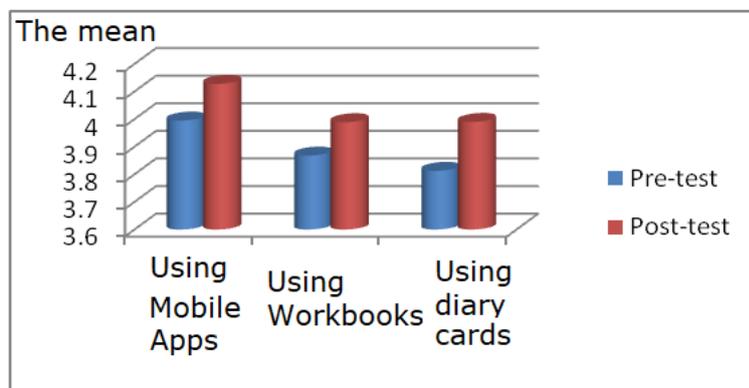
Figure 5.8: Pre-test and post-test scores for the three groups (metacognitive component)

Critical component

Since the Box's M in the Box's Test of Equality of Covariance Matrices is not significant; (p=0.41) which is greater than (p=0.05), then, the assumptions of the multivariate model have been not violated and this model could be used (Kremelberg, 2011). The table (5.19) indicates that the Wilks' lambda F-test for Time x Group interaction effect is 1.29 with a p value of 0.282.

Table 5.19: Multivariate Tests (Critical component)

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time x Group Lambda	Wilks'	0.97	1.29	2.00	80.00	0.282	0.031

The multivariate test reveals that the effect of time at type of training platform on test scores did not vary significantly which means that the growth over time in the critical component of the reflective practices instrument did not differ in any group, Wilks' lambda F-test=1.29, *p*=0.282, η2=0.031 (Kremelberg, 2011).
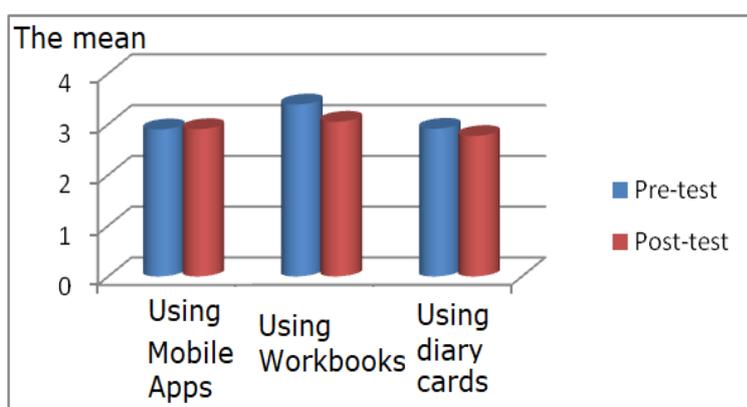
Figure 5.9: Pre-test and post-test scores for the three groups (critical component)

Conclusion

In general, the enhancement of teachers' reflective practices has mainly, but not significantly, occurred with those participants who have employed mobile applications as a platform (experimental group). This enhancement has occurred with all of the components of reflective practices. Yet, there is barely an improvement, but not significant too, in some components of the reflective practices (only in practical and metacognition components) in the other two groups (Control group1: using workbook and control group 2: using diary cards). Overall, the tests revealed that the effect of time on the type of training platform on test scores did not vary significantly. In other words, the growth over time in science teachers' reflective practices did not differ significantly in any group, and this is also the case in all components of the reflective practices instrument.

5.2.3 Evidence of teachers' reflective practices from their activities

Introduction

This section covers participants' appraisals of using the training platforms for the experimental and control group1. It addresses the extent to which each participant was involved in implementing the activities. Then, it shows the assessment of teachers' engagement with the activities (Mobile apps: Facebook and Twitter vs. Workbook).

5.2.3.1 Teachers' appraisal of using the training platforms for the experimental and control group1

Before identifying evidence of the activities impact on teachers' reflective practices, the set of activities that were actually implemented by participants was identified. In general, the level of implementing the activities shows that the participants have a strong level of commitment in conducting them, despite consuming a lot of time and effort to complete these activities. I was able to estimate the effort and time needed for achieving the activities in the case of the experimental group. This was due to the fact that I personally managed the Facebook and Twitter pages, and thus I was able to trace any responses. However, I was unable to assess the time and effort needed for completing the control group1's activities. This may refer to an important feature that mobile applications could provide. The following table shows the extent to which each of the activities was accomplished by the experimental group participants.

Table 5.20: The extent to which each activity was completed by the experimental group participants (Facebook & Twitter)

N	Nickname/Activity	1	2	3	4	5	6	7	8	9	10	11	12	The Percentage
1	Omani-n	√	√	√	√	√	√	√	√	√	√	√	√	100%
2	Omani-lm	√	√	√	√	-	√	√	√	√	√	√	√	92%
3	Omania-a	√	√	√	√	√	√	√	√	√	√	√	√	100%
4	Omani-z	√	√	√	-	√	-	√	-	√	√	√	-	66.7%
5	Omania-l	√	√	√	√	√	√	√	√	√	√	√	√	100%
6	Omani-v	√	√	√	-	√	-	√	-	√	√	√	√	75%
7	Omania-tu	√	√	-	-	√	√	√	-	√	√	√	-	66.7%
8	Omani-om	√	√	√	√	√	√	√	√	√	√	√	√	100%
9	Omani-bn	√	√	√	√	√	√	√	√	√	√	√	√	100%
10	Omani-u	√	√	√	√	√	√	√	√	√	√	√	√	100%
11	Omania-j	√	√	-		√	√	-	√	-		√	-	50%
12	Omani-w	√	√	√	√	√	√	√	√	√	√	√	√	100%
13	Omani-i	√	√	-	√	√	√	-	√	√	-	√	-	66.7%
14	Omani-yp	√	√	√	√	√	√	√	√	-	√	√	√	92%
15	Omani-hi	√	√	√	√	√	√	√	√	√	√	√	√	100%
16	Omania-f	√	√	√	√	√	√	√	√	√	√	√	√	100%
17	Omani-tc	√	√	√	√	√	√	√	√	√	√	√	√	100%
18	Omania-yt	-	-	√	-	√	-	-	-	√	√	√	√	50%
19	Omania-r	√	√	√	√	√	√	√	√	√	√	-	√	92%
20	Omania-c	√	-	√	-	√	-	√	-	√	√	√	√	66.7%
21	Omania	√	-	-	-	√	-	√	-	√	√	√	√	58.3%
22	Omania-g	-	-	-	-	√	-	√	-	√	-	-	-	25%
23	Omani-q	-	√	√	√	-	√	√	√	√	√	√	√	83.3
24	Omani-oo	-	√	-	√	√	√	√	√	√	-	√	-	66.7%
25	Omania-op	-	√	-	-	-	-	-	√	-	√	-	-	25%
26	Omania-t/x	-	-	√	-	-	√	√	√	-	-	√	-	41.7%
27	Omani-wt	-	√	√	-	-	-	√	-	-	-	-	√	33.3%
28	Omani-as	-	√	√	√	-	√	√	√	-	√	-	√	66.7%
	The Average													**76 %**

(√): the question has been answered, (-) the question has not been answered.

In contrast, the following table shows the extent to which each of the activities was completed by the control group1 participants:

Table 5.21: The extent to which each activity was completed by the control group1 participants

N	Nickname/Activity	1	2	3	4	5	6	7	8	9	10	11	12	The Percentage
1	Omani-1	√	√	√	√	√	√	√	√	√	√	√	√	100%
2	Omani-2	√	√	√	√	√	√	√	√	√	√	√	√	100%
3	Omani-3	√	√	√	√	√	√	√	√	√	√	√	√	100%
4	Omania-4	√	√	√	√	√	√	√	√	√	√	√	√	100%
5	Omania-5	√	√	√	√	√	√	√	√	√	√	√	√	100%
6	Omania-6	√	√	√	√	√	√	√	√	√	√	√	√	100%
7	Omania-7	√	√	√	√	√	√	√	√	√	√	√	√	100%
8	Omani-8	√	√	√	√	√	√	√	√	√	√	√	√	100%
9	Omani-9	√	√	√	√	√	√	√	√	√	√	√	√	100%
10	Omani-10	√	√	√	√	√	√	√	√	√	√	√	√	100%
11	Omani-11	√	√	√	√	√	√	√	√	√	√	-	√	92 %
12	Omania-12	√	√	√	√	√	√	√	√	√	√	√	√	100%
13	Omania-13	√	√	√	√	√	√	√	√	√	√	√	√	100%
14	Omania-14	√	√	√	√	√	√	√	√	√	√	√	√	100%
15	Omania-15	√	√	√	√	√	√	√	√	√	√	√	√	100%
16	Omania-16	√	√	√	√	√	√	√	√	√	√	√	√	100%
17	Omani-17	√	√	√	√	√	√	√	√	√	√	√	√	100%
18	Omani-18	√	√	√	√	√	√	√	√	√	√	√	√	100%
19	Omani-19	√	√	√	√	√	√	√	√	√	√	√	√	100%
20	Omani-20	√	√	√	√	√	√	√	√	√	√	√	√	100%
21	Omani-21	√	√	√	√	√	√	√	√	√	√	√	√	100%
22	Omania-22	√	√	√	√	√	√	√	√	√	√	√	√	100%
23	Omania-23	√	√	√	√	√	√	√	√	√	√	√	√	100%
24	Omania-24	√	√	√	√	√	√	√	√	√	√	√	√	100 %
25	Omani-25	-	-	-	-	-	-	-	-	-	-	-	-	0 %
26	Omani-26	-	√	√	√	√	-	-	-	-	-	-	-	33.3 %
	The Average													93.3 %

(√): the question has been answered, (-) the question has not been answered.

The previous two tables show that the participants of the control group1 implemented more activities (93.3%) than the participants of the experimental group (76%). Thus, it seems that it is much easier for the participants to be aware of the uncompleted activities by using workbooks rather than using mobile applications. It cannot be argued at this stage that using the workbook as a training platform is better than using mobile applications. This is because there are other aspects to be considered before giving that judgment, such as the quality of participants' responses.

5.2.3.2 The engagement of participants with the activities

Overview

For the purposes of estimating the participants' progress in their reflective practice levels for both groups after being involved in implementing the activities, the participants' engagement with the reflective cycles (Gibb's Cycle) and (Kolb's Cycle) has been estimated. The cases where the participants did not undertake the activities are treated as missing data

(for the purposes of analysing). Thus, the comparison between the two groups will only focus on the participants who have implemented the activities and it will ignore those who did not implement any part of these activities. As mentioned previously, the number of science teachers who completely ignored activities in the experimental group was higher than the number in the control group1. The activities were assessed based on the following four aspects:

1- To what percentage did the participant answer all of the questions *(P)?*
2- To what extent did the participant add extra answers (*Ex*) to the provided multiple choice answers?
3- To what extent did the participant answer the open questions (*O. q*)?
4- To what extent are the answers to the open questions related to the attached articles and videos (*R*).

The assessment of teachers' engagement (Facebook vs. Workbook)

The following table summarises the estimated engagement by all participants in the experimental group that used Facebook (Activities: 1, 3, 5, 7, 9, 10 and 11). It also shows equivalent data for corresponding workbook activities of control group1.

Table 5.22: The engagement estimations of all participants for activities (1, 3, 5, 7, 9, 10 and 11) of both groups (Experimental group: Facebook Vs. Control group1: Workbook)

Groups	Experimental group					Control group1				
Activity number	O. q (25)	R (12)	Ex (13)	P (50)	The Total (100)	O. q (25)	R (12)	Ex (13)	P (50)	The Total (100)
1	22.5	9.3	1.3	48.75	81.85	19.71	6.88	4.88	43.63	75.1
3	19.8	3.8	2.9	43.2	69.7	15.8	3.1	2.6	41.2	62.7
5	19.75	7.2	3.25	46.5	76.8	17.6	4.6	3.1	43.9	69.2
7	23.86	8.45	2.95	49.43	84.7	20.17	5.75	4.3	44.5	75
9	19.12	6.24	3.64	44.56	73.5	19.88	8.75	3.25	44.83	76.7
10	19.95	6.6	1.3	44.4	72.3	19.22	2.87	2.83	44.96	69.9
11	23.82	8.73	1.77	48.14	82.45	20.57	8.09	2.83	45.30	76.8
The Average	**21.26**	**7.19**	**2.44**	**46.43**	**77.32**	**18.99**	**5.72**	**3.34**	**44.05**	**72.1**

The table above shows that the total average estimations of the engagement for the experimental group in activities (1, 3, 5, 7, 9, 10 and 11) is slightly better than the total average estimations of the engagement of control group1 (Experimental group total average= 77.32 vs. Control group1 total average= 72.1). However, the control group1's total

engagement estimation is slightly better only in the activity (9) than its counterpart in the experimental group.

In fact, comparing both group activities' answers, indicates that the participants of the experimental group who decided to implement the activity gave better answers to the open questions (*O.q*) than the control group1 (Experimental group: 21.26 vs. Control group1: 18.99). Many of them (experimental group) gave more than two answers for each of the open questions (*O.q*). The following example of activity1 could illustrate the difference between both groups in their method of answering the only two open questions of the activities.

Experimental group — Open questions

Q5	Q6
a. Giving each student his right regarding classroom activities and continuous assessment. b. Getting down to the level of the weak students as well as taking into account other students who have higher abilities.	a. Diversification in home works and activities b. Enhancing students' motivation.
a- Motivating students' learning through the diversity of teaching methods and the use of new strategies in teaching which could be loved and could be interested to the students, away from the method of indoctrination. b - Activating the cooperating learning. c - Diversification in educational aids that is beloved and interesting to the student. d - Enhancing values of citizenship. e - Taking into account the needs of students.	a. Diversification in teaching methods. b. Activating the cooperating learning. c. Using a diversity of teaching aids that could stimulate students toward learning.
Diversification in the teaching methods and diversity of teaching aids through the use of technology.	a. Diversification in teaching methods. b. Using a diversity of teaching aids.
a- Diversifying teaching methods and teaching aids. b - The use of collaborative learning. c. Providing different and comprehensive activities that suit the levels of students.	a. Activating the cooperating learning. b. Using attractive teaching aids.
a. Asking the high performance students to help with low performance students. b. Activating the cooperating learning.	a. Diversification in teaching methods. b. Activating the cooperating learning. c. Using a diversity of teaching aids that could stimulate students toward learning. d. Diversification in activities based on students' different levels.
a. Variation in teaching aids and methods of teaching with trying to present some sections that explain scientific experiments which cannot be done in the laboratory. b. Forming groups with different roles and give them the opportunity to prepare a lesson and make an	a. Diversification in teaching methods and aids and using stimulation program to show some experiments. b. asking students to teach in some lessons ,using an interactive white board and conducting entertaining competitions that

Control group — Open questions

Q5	Q6
Cooperative learning	a. Applying learning technology. b. Cooperative learning.
Nothing	a. Using Technology in teaching. b. Cooperative learning.
Providing an emotional and social environment.	a. Providing an emotional and social environment. b. Relying on students' desire and energy to reinforce the educational process.
Using sound effects during the lesson and raising the sound and reducing it according to the topic.	a. Encouraging cooperative learning. b. Strengthen the positive aspects of the student.
-	Providing an emotional and social environment.
Effective reinforcement	a. Effective reinforcement and listening. b. Taking care of continuous evaluation.
Providing the emotional and social environment.	a. Increasing number of home work. b. Taking care of continuous evaluation.
Strengthen the positive aspects among students.	a. Collaborative learning. b. Logical sequence of the lesson.

Figure 5.10: Activity1: Example of open questions answers (translated to English)

Furthermore, the experimental group is also better in the relatedness aspect (Experimental group: 7.19 vs. Control group1: 5.72). In contrast, the control group1 gave more extra answers (*Ex*) than the experimental group (Control group1: 3.34 vs. Experimental group: 2.44). However, the experimental group participants answered all types of questions (open and close questions) more than the control group (Experimental group: 46.43 vs. Control group1: 44.05).

The assessment of teachers' engagement (Twitter vs. Workbook)

The engagement's estimations for all participants in both groups: experimental and control group1, who have implemented the activities (2, 4, and 6) in Twitter vs. the Workbook, are shown in the following tables:

Table 5.23: The engagement estimations of all participants for activities (2, 4, and 6) of both groups (Experimental group: Twitter Vs. Control group1: Workbook)

Groups	Experimental group		The Total	Control group1		The Total
Activities number	P (87)	Ex (13)		P (87)	Ex (13)	
2	82.84	0.57	83.4	83.44	1.77	85.2
4	86.03	0	86.0	82.29	3.25	85.5
6	83.52	1.95	85.5	82.46	2.26	84.7
The Average	**84.13**	**0.84**	**85.0**	**82.37**	**2.43**	**85.1**

This table, in general, shows that there are no clear differences in the engagement's estimations of all participants in the activities (2, 4, and 6) between both groups whether using Twitter as a platform or using the Workbook.

Conclusion

As a conclusion, the participants of the experimental group are slightly more engaged in the activities (1, 3, 5, 7, 10 and 11) compared to the participants of the control group1 (Experimental group: 77.32 vs. Control group1: 72.1). However, it is almost the same in the case of the activities of Twitter (2, 4 and 6). This may lead to contend that the experimental group has practised reflection slightly more than the participants in the control group1 when they employed Facebook. As a result, we can assume that their improvement in reflective practice levels might be better than their counterpart in the control group1 where Facebook is the platform.

5.3 Summary of the chapter

Omani science teachers who teach 10th Grade classes practise reflection at a medium level, according to a five-point Likert scale. The highest components of reflective practices are the metacognitive and learner components. Besides, the difference in the mean reflective practices scores between Omani male science teachers and Omani female science teachers is statistically significant, in favour of the Omani female science teachers. In fact, the results of the reflective practices' instrument indicate that reflective practices of Omani female science teachers overcome those practices of the Omani male science teachers within almost all types of strata. It seems that the best stratum in practising reflection is the stratum of Omani female science teachers who teach in urban school and have many years of experience. Further, it seems that the worst stratum in practising reflection is the stratum of Omani male science teachers who teach at urban schools and have less years of experience.

Comparing the responses of informants of all groups (experimental group, control group1, and control group2) may lead us to conclude that the positive impact of using mobile applications as a training platform on science teachers' reflective practices is significantly better than its counterpart in the control group1 and control group2. Furthermore, the analysis of activities shows that the experimental group has practised reflection slightly more than the participants in the control group1 when they employed Facebook. As a result, we can assume that their improvement in the reflective practice levels might be better than their counterpart in the control group1 where Facebook is the platform. However, the standardised measures data shows that the effect of time on the type of training platform on test scores did not vary significantly. In other words, the growth over time in science teachers' reflective practices did not differ significantly in any group, and this is also the case in all components of the reflective practices instrument. For more details, see Appendix N, p.324.

Chapter Six: Effects of the Intervention on Motivation

Introduction

The current chapter presents the results regarding Omani science teachers' motivation. It begins with revealing the extent to which those teachers are motivated towards teaching and planning lessons. This is conducted through the incorporation of two sources of data: the baseline data and the interview data. The baseline data were gathered from Omani science teachers who teach 10th Grade (n=150) by using motivation instruments. The interview data were gathered from 21 participants in the intervention of the study which has an overall of 83 participants. The chapter then shows the impact of the study's intervention on Omani science teachers' motivation towards teaching and towards planning lessons. To achieve this, evidence from the interview data, the standardised measures data, and the activities data are utilised.

6.1 The extent to which Omani science teachers are motivated towards teaching and planning lessons

Introduction

This section clarifies Omani science teachers' perspectives (based on interview data and baseline data) regarding the extent to which they are motivated towards teaching and planning lessons. Further, it shows their perceptions regarding the previous variables according to their gender, years of experience, and school location.

6.1.1 The extent to which they are motivated towards teaching and planning lessons based on interview data

The study investigates the extent to which 10th Grade Omani science teachers are motivated towards teaching and planning lessons. The research question regarding this aspect is: To what extent are science teachers in The North AL Batinah Region of the Sultanate of Oman motivated towards teaching and planning lessons?

According to the interview data (Pre-interview, September 2016), 71 per cent of the informants (15 out of 21) claimed that they are motivated towards teaching and planning lessons, while 14 per cent of them were not sure, and about 14 per cent of them were sure that they are not motivated towards teaching and planning lessons. I also asked them about the extent to which (out of 10) they thought they were motivated towards teaching and planning lessons. The mean score of their estimations regarding answering this question was 7.2 out of

10. Thus, we may argue (according to the Omani science teachers' perspective) that they are at a level of motivation towards teaching and planning lessons that is higher than medium. In fact, many Omani science teachers claimed that they are highly motivated despite their differences in the years of experience. For example, Omani-19 teacher from the control group1 who has medium years of experience stated:

> *"I have a high motivation which could 9 out of 10. It is just a personal habit since I don't accept failures in front of my students. I love to be excellent according to their perspectives. I also have an internal motivation that drives me to work in a good way".*

Whereas, Omania-yt teacher, who has short years of experience and belongs to the experimental group, claimed: *"I have a high motivation 9 out of 10. I am very interested in teaching. I have a desire to give whatever I have to help students to learn".* Further, Omani-om teacher from the experimental group who has medium years of experience, said: *"my motivation is very high 10 out of 10. I have never been absent and I have never asked for a holiday. This is a clear sign of having a high level of motivation".*

In contrast, some of those teachers contend that they are not motivated. For instance, Omani-n teacher, who has many years of experience, stated: *"I had a high motivation when I started teaching, it might be 9 out of 10 but now after 19 years of teaching my motivation is very low 4 out of 10".* Another teacher (Omani-A$_5$) who has many years of experience and is from control group 2 said: *"Sometimes I feel that I don't have an enough motivation to continue with this profession (4 out of 10). Now I have completed 21 years and I think it is time to get retired".* Notably, it cannot be confirmed that the motivation of Omani science teachers with a high number of years of experience is low since only three of the informants indicated that their motivation is low (two of them were with long teaching experience).

The baseline data gathered by the instrument of the motivation towards teaching and planning lessons may support the interview findings which point out that Omani science teachers are at a level higher than medium, regarding teaching and planning lessons.

6.1.2 The extent to which Omani science teachers are motivated towards teaching based on the baseline data

In terms of motivation towards teaching, the next table represents the mean and standard deviation of the participants' responses to the items of the instrument that was taken from Fernet et al. (2008, p.277):

Table 6.1: Mean and Standard Deviation of the Instruments Items (motivation towards teaching variable)

Component	N	Items	Mean	Standard Deviation
Identified Regulation	15	Because this task allows me to attain work objectives that I consider important.	6.36	0.95
	10	Because I find this task important for the academic success of my students.	6.29	1.31
	3	Because it is important for me to carry out this task.	6.12	1.36
Mean			**6.26**	**0.98**
Intrinsic	4	Because I find this task interesting to do.	5.63	1.58
	6	Because it is pleasant to carry out this task.	5.68	1.46
	11	Because I like doing this task.	5.90	1.24
Mean			**5.74**	**1.19**
Introjected Regulation	2	Because if I don't carry out this task, I will feel bad.	5.78	1.72
	7	To not feel bad if I don't do it.	5.45	1.74
	9	Because I would feel guilty not doing it.	5.71	1.62
Mean			**5.65**	**1.49**
External	1	Because the school obliges me to do it.	2.95	2.13
	8	Because my work demands it.	5.78	1.67
	14	Because I'm paid to do it.	4.19	2.22
Mean			**4.31**	**1.43**
Amotivation	13	I don't know, I don't always see the relevance of carrying out this task.	2.05	1.57
	5	I don't know, sometimes I don't see its purpose.	2.03	1.57
	12	I used to know why I was doing this task, but I don't see the reason anymore.	2.47	1.88
Mean			**2.18**	**1.42**
Mean of all instrument items			**4.83**	**0.78**

The previous table shows that the total mean of the instrument items is equals to 4.83 which supports the interview findings that Omani science teachers' motivation towards teaching is at a level higher than medium, according to a seven-point Likert scale. Table (6.2) shows the mean of the main components of the instrument:

Table 6.2: The Mean of the Components of Motivation towards Teaching

Ranking list	The components	The Mean
1	Identified Regulation Motivation	6.26
2	Intrinsic Motivation	5.74
4	Introjected Regulation Motivation	5.65
3	External Regulation	4.31
5	Amotivation	2.18

This table shows that the Identified Regulation Motivation component (an extrinsic motivation) is the highest component with Omani science teacher (M=6.26). It seems that Omani science teachers' extrinsic motivation is slightly higher than their intrinsic motivation. There is a big difference, as the table shows, between the mean of the Identified Regulation Motivation component (M=6.26) and both the External Regulation component (M=4.31) and Amotivation component (M=2.18). In contrast, the differences between the mean of the Identified Regulation Motivation component (M=6.26) and the other type of component, such as the Intrinsic Motivation component (M=5.74) and Introjected Regulation Motivation component (M=5.65) are about (0.5) and (0.6) respectively, which does not seem too high.

6.1.3 The extent to which Omani science teachers are motivated towards planning lessons based on baseline data

The current study also investigates the extent to which Omani science teachers are motivated towards planning lessons. Baseline data were used again to answer this question. The next table represents the mean and the standard deviation of the participants' responses to the instrument's items that was taken from Fernet et al. (2008, p.277):

Table 6.3: The mean and standard deviation of instruments items (motivation towards planning lessons variable)

	N	The Items	Mean	Standard Deviation
Identified Regulation	15	Because this task allows me to attain work objectives that I consider important.	6.15	1.24
	10	Because I find this task important for the academic success of my students.	6.11	1.26
	3	Because it is important for me to carry out this task.	5.72	1.39
Mean			**5.99**	**1.12**
Introjected Regulation	2	Because if I don't carry out this task, I will feel bad.	5.45	1.72
	7	To not feel bad if I don't do it.	5.45	1.69
	9	Because I would feel guilty not doing it.	5.45	1.77
Mean			**5.45**	**1.50**
Intrinsic	4	Because I find this task interesting to do.	5.25	1.63
	6	Because it is pleasant to carry out this task.	5.24	1.53
	11	Because I like doing this task.	5.17	1.51
Mean			**5.22**	**1.33**
External	1	Because the school obliges me to do it.	3.77	2.05
	8	Because my work demands it.	5.94	1.31
	14	Because I'm paid to do it.	3.81	2.35
Mean			**4.50**	**1.35**
Amotivation	13	I don't know, I don't always see the relevance of carrying out this task.	2.51	1.83
	5	I don't know, sometimes I don't see its purpose.	2.14	1.53
	12	I used to know why I was doing this task, but I don't see the reason anymore.	2.66	1.88
Mean			**2.44**	**1.43**
Mean of all instrument items			**4.72**	**0.72**

The previous table shows that the Omani science teachers' motivation towards planning lessons is at a level higher than medium, according to a seven-point Likert scale, since the mean of the instrument items equal to 4.72. Table (6.4) shows the mean of the instrument main components:

Table 6.4: The Mean of the Components of Motivation towards planning lessons

Ranking list	The components	The Mean
1	Identified Regulation Motivation	5.99
2	Introjected Regulation Motivation	5.45
3	Intrinsic Motivation	5.22
4	External Regulation	4.50
5	Amotivation	2.44

Similar to the case of motivation towards teaching, the previous table shows that the Identified Regulation Motivation component is the highest component with Omani science teachers (M=5.99). The table also shows that the differences between the mean of the Identified Regulation Motivation component (M=5.99) and the other two components of the instrument, Introjected Regulation Motivation component (M=5.45) and Intrinsic Motivation component, (M=5.22) are not too high. However, there is a big difference between the mean of the Identified Regulation Motivation component (M=5.99), and both the External Regulation component (M=4.50) and Amotivation component (M=2.44), which is similar to the case of motivation towards teaching. In order to identify the meaning of the components, see Chapter Three, section 3.1.5.2, p.98.

6.1.4 Supportive evidence from interview data regarding levels of teachers' motivation components

The analysis of interview data also shows that Omani science teachers' extrinsic motivation levels seem to be higher than their intrinsic motivation levels. A large number of them claimed that external influences, such as workload, students' behaviours, students' motivation towards learning, relationship with school administration and colleagues, financial reinforcements, educational aids, curriculum, and promotion, considerably affect teachers' motivation towards teaching and planning lessons. For example, six informants claimed that their relationship with school administration is important for improving their motivation, while, ten of them mentioned that they would work much better in the case of having financial reinforcement. Furthermore, seven informants argued that workload influence affects their motivation.

In terms of Identified Regulation Motivation (thinking that implementing the activity is important (Ryan and Deci, 2000)), the interview data evidence shows that teachers may engage in a task only if they believe that the task is important for them. The importance of teaching and planning for them comes from different sources. For instance, Omania-yt

teacher pointed out that she gives whatever she can in order to help students to learn. Another teacher (Omania-wt) said: *"My motivation was very low when I started teaching, but in time it became high (8 out of 10). This is because I have realised that as a teacher I play a crucial role in my students' life"*. Omania-A$_2$ teacher stated: *"I'm motivated. The reasons are: I love teaching and I love having a good relationship with students. I don't care about external factors in order to be motivated"*. This means that working as a teacher is important for them, and this importance derives from the importance of students for them.

In terms of the Introjected Regulation Motivation (*"The avoidance of guilt and anxiety or to attain ego enhancements such as pride"* (Ryan and Deci, 2000, p.72)), Omania-f teacher might be a good example. She stated when she was asked whether she is a motivated teacher or not, she replied, *"Yes, I have good motivation to teach may be 7 out of 10. In fact, I like to be one of the best science teachers in the school. I would feel unsatisfied if I found out that my students are not able to follow my explanations while teaching"*. Her motivation seems to originate from the intention of attaining ego enhancements, such as pride and avoiding any feelings of guilt.

Besides, based on the interview evidence, it can be argued that Omani science teachers have a considerable degree of intrinsic motivation (performing an activity for obtaining pleasure and satisfaction (Ryan and Deci, 2000)). For example, Omani-lm claimed that teaching itself is the reason behind his motivation. He said: *"I have motivation towards my profession because I like to be a teacher"*. Furthermore, there is another intrinsic factor that seems to be important for some informants. It is the teachings of the Islamic religion which emphasise the devotion to work. Omania-A$_1$ teacher stated: *"The observation of God and sincerity are the sources of my motivation"*.

On the other hand, as mentioned previously, only three informants acknowledged that they are suffering from declining in their motivation towards school work. This supports the baseline result that indicates that the mean of the Amotivation component in both instruments of motivation is very low.

6.1.5 Comparison between teachers' motivation levels according to their gender, school location, and years of experience

In order to compare the mean scores of Omani science teachers' motivation according to their gender, school location, and years of experience, the researcher first conducted the normality test for the pre-test data provided by the instrument of both motivation instruments.

He found that data are not normally distributed. Thus, the decision to apply non-parametric tests for analysing these data was made.

a. Gender

The Mann-Whitney U test was conducted in order to identify whether the difference in the mean scores of motivation towards teaching between male and female teachers is statistically significant. The results show that the mean scores of motivation of Omani female science teachers' towards teaching are higher than the mean scores of motivation of Omani male science teachers (the mean scores of male and female teachers are 71.74 and 78.97, respectively). However, this pattern is not statistically significant (U= 2537.0, Z= -1.02, $p=$ 0.31). In terms of motivation towards planning lessons, the Mann-Whitney U test indicated that the mean scores of motivation of Omani female science teachers' towards planning lessons are higher than the mean scores of motivation of Omani male science teachers (the mean scores of male and female teachers are 66.78 and 83.55, respectively), the results show that this pattern is statistically significant (U= 2180.0, Z = -2.36, $p = 0.020$).

b. School location

The Mann-Whitney U test was conducted in order to identify whether the difference in the mean scores of motivation towards teaching between Omani science teachers at urban schools and Omani science teachers at rural schools is statistically significant. The results show that the mean scores of motivation of Omani science teachers towards teaching at urban schools are higher than the mean scores of motivation of Omani science teachers towards teaching at rural schools (the mean scores of teachers at urban schools and teachers at rural schools are 77.60 and 69.93, respectively). This pattern is not statistically significant (U= 2006.0, Z= -0.96, $p=$ 0.34). In terms of motivation towards planning lessons, the Mann-Whitney U test indicated that the mean scores of motivation of Omani science teachers towards planning lessons at urban schools are higher than the mean scores of motivation of Omani science teachers towards planning lessons at rural schools (the mean scores of teachers at urban schools and teachers at rural schools are 79.32 and 65.35, respectively), the results show that this pattern is not statistically significant (U= 1818.5, Z = -1.76, $p=$ 0.08).

c. Years of experience

The Kruskal-Wallis H test was carried out to investigate if there is a statistically significant difference in the mean scores of motivation towards teaching in Omani science

teachers between their years of the experience periods (short period, medium period, and long period). No statistically significant differences ($\chi^2 = 1.57$, $p = 0.46$, df= 2) were found among the three categories of teachers. The Kruskal-Wallis H test was conducted again to investigate if there is a statistically significant difference in the mean scores of motivation towards planning lessons of Omani science teachers between their years of the experience periods (short period, medium period, and long period). No statistically significant differences ($\chi^2 = 1.91$, $p = 0.38$, df= 2) were found among the three categories of teachers.

In terms of the strata that constitutes the study sample, the results of the motivation towards teaching instruments indicated that, in general, motivation of Omani female science teachers was higher than the motivation of the Omani male science teachers within all types of strata, except the stratum of Omani female science teachers who teach at rural schools, with long years of experience or with short years of experience. Furthermore, it was found that Omani male science teachers who teach at rural schools and have long years of experience, and Omani female science teachers who teach at urban schools and have long years of experience, both have the highest score in motivation towards the teaching instrument. In contrast, it seems that the worst stratum regarding motivation towards teaching is the stratum of the Omani male science teachers who teach at urban schools and have short years of experience. The following two graphs summarise the results of all strata:
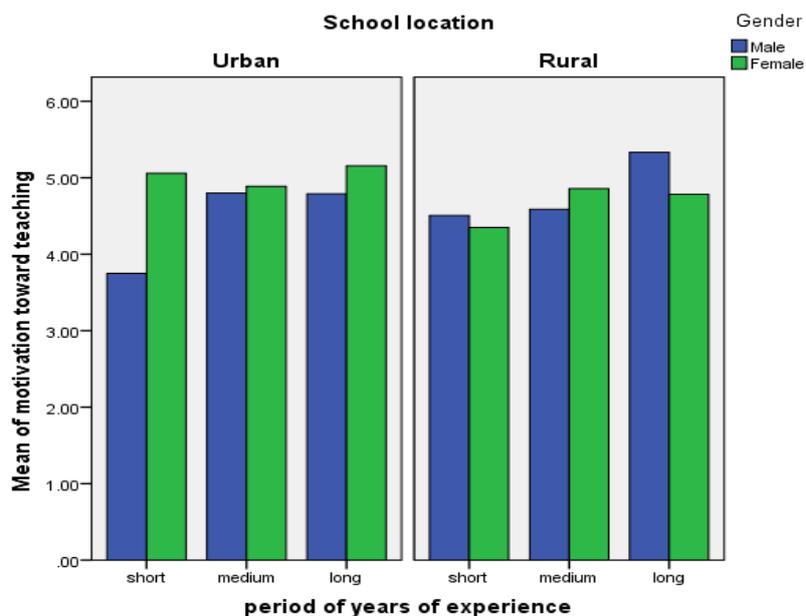
Figure 6.1: Mean of teachers' motivation towards teaching of all strata

The results of the motivation towards planning lessons instrument indicate that the motivation of Omani female science teachers, in general, is higher than the motivation of the Omani male science teachers, within all types of strata except the stratum of Omani female science teachers who teach at rural schools, and have long years of experience or short years of experience, which is exactly the same as their result in the case of motivation towards teaching.

Furthermore, it was found that Omani male science teachers who teach at rural schools and have long years of experience, and Omani female science teachers who teach at urban schools and have long years of experience, both have the highest score on motivation towards the planning lessons instrument. Similarly to the case of motivation towards teaching, it seems that the worst stratum regarding motivation towards planning lessons is the stratum of Omani male science teachers who teach at urban schools and have short years of experience. The following two graphs summarise the results of all strata:
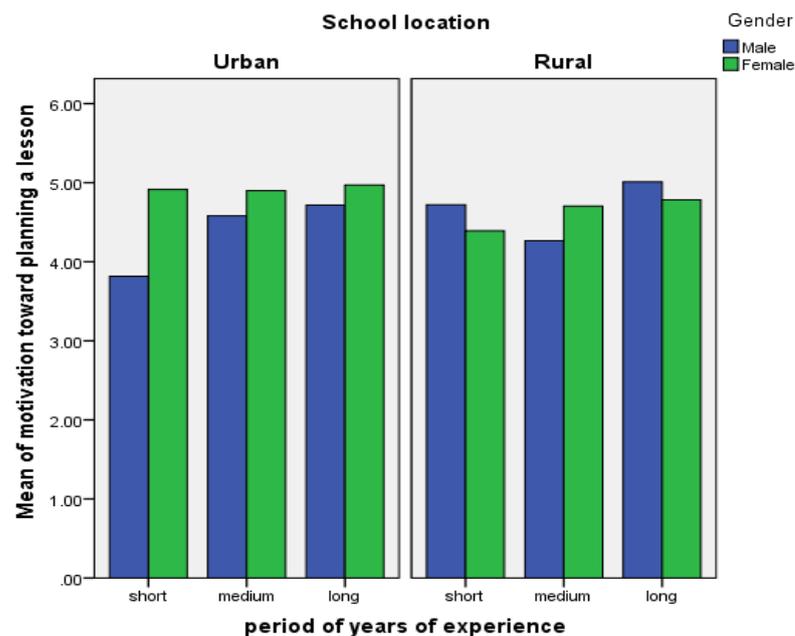
Figure 6.2: Mean of teachers' motivation towards planning lessons of all strata

6.1.6 The conclusion results from both instruments

According to the mean of both motivation instruments items, it seems that Omani science teacher' motivation towards teaching and planning lessons is at a level higher than medium according to a seven-point Likert scale. The highest component of motivation in both instruments of motivation is the Identified Regulation component which is a part of extrinsic motivation. However, intrinsic motivation is considerably high in both instruments

(instrument of motivation towards teaching and instrument of motivation towards planning lessons). Furthermore, the mean of the Amotivation component in both instruments of motivation is very low.

In terms of motivation towards planning lessons, the Mann-Whitney' U test indicated that the mean scores of motivation of Omani female science teachers' towards planning lessons are higher than the mean scores of motivation of Omani male science teachers (the mean scores of male and female teachers are 66.78 and 83.55, respectively), and the results show that this pattern is statistically significant (U= 2180.0, Z = -2.36, p = 0.020). The results also show that generally, Omani female science teachers are better in their motivation towards teaching and planning lessons than Omani male science teachers. The results indicate that the stratum of Omani male science teachers who teach at urban schools and have shorter years of experience is the worst stratum regarding motivation towards teaching and towards planning lessons.

6.2 Effects of the intervention on teachers' motivation

Introduction

The current study reveals the impact of its intervention on Omani science teachers' motivation towards teaching and planning lessons through the incorporation of various sources of data: interview data, activities data, and standardised measures data. These data were integrated together in order to form a clear picture regarding any changes in teachers' motivation, if any existed. The processes of finding evidence started with analysing the interview data. Then, the standardised measures data and the participants' activities were analysed.

6.2.1 Evidence from interview data

Another main objective of these programmes is to improve teachers' motivation towards teaching and planning lessons. Many studies indicate that there is a necessity to devote a great deal of effort to increase the motivation of any employee (Hollyforde and Whiddett, 2002). There is also considerable pressure to reveal the factors and processes that underlie the quality of teachers, especially in relation to the identity of the motives that are responsible for teachers' engagement, commitment, and persistence (Watt and Richardson, 2008). Motivation has a key effect on the process of teachers' professional development, as Malone and Lepper (1987) claim, in that motivation is a key factor for engaging in any

learning activities whereby levels of its availability with learners may affect the effectiveness of their learning. The following findings illustrate the views of the targeted teachers on the impact of these different programmes (using mobile apps, workbooks, and using diary cards) on their motivation towards teaching and planning lessons, and which of these programmes is more useful regarding the enhancing of their motivation towards teaching and planning lessons. The informants of all three groups have given various appraisals about the impact of the type of training that they have engaged with. The coming discussion focuses on determining the positive, neutral, and negative appraisal for all three training platforms. Then, a deeper discussion takes place to explicate how the use of mobile applications and workbooks as training platforms impacts teachers' motivation towards teaching and planning lessons.

6.2.1.1 Tracing teachers' appraisal of using the three training platforms

Introduction

This section addresses teachers' perspectives about the training platforms and activities. It begins with the experimental group's opinions. It then shows the opinions of both control group1 and control group2.

1- Experimental group's opinions

The following table shows a summary of the participants' appraisal of training platforms using mobile applications with a specific programme.

Table 6.5: A summary for the experimental group participants' appraisal of their training programme

The type of appraisal	No of references	Contents
Positive	13	Useful experiment, increased my motivation towards teaching and planning, interesting in learning how to use Twitter and Facebook, reduced my effort in planning lessons.
Neutral	1	My motivation towards teaching skills is still not high.
Negative	4	Increased my workload, it didn't change my motivation.

The previous table reveals the opinions of the participants of the experimental group about the use of mobile applications as a training platform. As shown in the table, the majority of them describe it as a useful programme which has had a positive impact on their motivation. Nine of the experimental group participants mentioned that using mobile

applications as a training platform increased their motivation towards teaching and planning lessons. Yet, a few of them mentioned that they did not receive any benefit regarding enhancing their motivation towards teaching and planning lessons. In contrast, two participants in this group think that this programme increased their workload. The following quotes illustrate the opinions of the experimental group about the impact of their training programme. Omania-yt, who is a new teacher at an urban school, said:

> *"The programme changed my motivation towards teaching and planning… I was very interested when I saw some colleagues saying that their level of some teaching skills reached 9 or 10, and I asked myself why I can't be like them. However, sometimes I feel satisfied when I see my level in a skill equals the level of most of my colleagues. This has given me a sign that I am in the right path".*

What is interesting here is that this teacher tries to determine her abilities of teaching and planning compared to her colleagues and that was her drive to implement the activities. Another teacher (Omani-n), with 19 years of experience as a teacher, and teaches in an urban school, said:

> *"I believe the programme changed my motivation towards teaching and planning. Giving me some examples of ready-made lessons plans has provided me the needed educational aids and reduced my effort in searching. In addition, some activities in Facebook application were very useful in improving my motivation towards some of teaching skills, especially, differentiation skills. However, I don't think I have the same level of motivation towards all of the discussed skills. I also still find difficulties in improving some skills, such motivating students towards learning".*

This informant clearly focused on the benefit of the ready-made lessons plans as the reason behind his satisfaction with the programme. However, he also mentioned that his motivation towards some teaching skills was not high. Finally, Omania-f teacher who has five years of experience as a teacher, and teaches at an urban school, mentioned that:

> *"It was fascinating and interesting to participate in this programme since I didn't have prior knowledge of how to use Facebook or Twitter. I think this might be one of the main factors that pushed me to say that my motivation towards teaching and planning ...became better than before".*

This teacher was interested in using Facebook and Twitter, since she had never utilised these apps previously. These applications were the reason for her satisfaction with this programme which is an interesting point. In contrast, it seems that the impact was slightly different in the case of a teacher in rural schools. For instance, Omania-l teacher said:

"I believe that my motivation towards teaching became better than before ... However, I have many curricula to teach and that led me to feel sometimes that it is just a sort of burden". In addition, Omani-tc also described the programme as another burden. He said: *"However, I felt sometimes that the programme might be another burden"*. Thus, despite that the programme could be useful regarding improving teachers' motivation towards teaching and planning lessons, it could be considered as another type of workload at rural schools.

Conclusion

According to the majority of the experimental group participants, the programme was helpful regarding improving their motivation towards teaching and planning lessons.

2- Control group1 opinions

The positive views regarding the role of the programme in enhancing motivation towards teaching and planning lessons in the case of control group1 are less than its counterpart in the experimental group. The following table shows a summary of the participants' appraisal of training platforms using workbooks.

Table 6.6: A summary of the control group1 participants' appraisal of their training platforms

The type of appraisal	No of references	Contents
Positive	1	The programme increased my motivation
Neutral	3	No effect on my motivation.
Negative	9	Increased workload, activities number need to be reduced, some activities are boring sometimes.

This table reveals the opinions of the participants of control group1 about the use of workbooks as a training platform. As shown in the previous table, the majority of them tend to describe it as a negative method regarding enhancing their motivation towards teaching and planning lessons. In contrast, only one of them claims that the programme has positively impacted their motivation towards teaching and planning lessons. Furthermore, a few of the participants mentioned that there was no effect of this programme on their motivation.

The following quotes illustrate the opinions of the participants in control group1 about the impact of their training programme. Omani-19 teacher who teaches at an urban school said: *"... I think it is so costly to do 12 activities if you bear in mind the teaching loads on teachers. In addition, despite the change of the activity's topic, the structure of all activities is similar which may lead to feeling boring"*. Another participant of the same group said:

"There were a lot of activities, sometimes I feel bored while doing them. I think 12 activities were too much, 6 activities would be much better. However, the workbook was useful. I don't know if there is a change in my motivation". Whereas, Omania-4 teacher said: *"I think the programme didn't change my motivation level. Sometimes, it was boring and I consider it as another type of workload due to the high number of activities".* Contrary to the experimental group, this group clearly feels that the number of activities and the number of papers attached to the workbook were very high, which made them feel that this programme is just another burden added to their existing duties.

Conclusion

According to the majority of control group1 participants, the programme increased their workload and was not so helpful regarding improving their motivation towards teaching and towards planning lessons.

3- **Control group 2 opinions**

The majority of informants of this group mentioned that there was no positive impact of this programme regarding their motivation towards teaching and planning lessons. The following table shows a summary of the participants' appraisal of training platforms, using mobile applications without a specific programme.

Table 6.7: A summary of the control group2 participants' appraisal of their training platforms

The type of appraisal	No of references	Contents
Positive	1	A little change in my motivation
Neutral	0	-
Negative	5	Not effective on enhancing motivation.

The following quotes illustrate the opinions of the participants in control group2 about the impact of their training programme. Omani-A$_4$ said: *"The diary card was useful in encouraging me to use mobile applications, but I don't think that it affected my motivation levels".* The majority of informants in this group agree with the previous quote, and had the same evaluation. It is clear that they did not notice any enhancement in their motivation towards teaching and planning lessons due to their participation in the programme.

Conclusion

According to the quotations from the experimental group, there is a positive impact of using mobile applications as a training platform on their motivation towards teaching and planning lessons. In contrast, the majority of control group1 participants claimed that their training programme increased their workload and was not so helpful regarding improving their motivation towards teaching and planning lessons. Furthermore, the control group2 participants argued that there is no change in their motivation levels towards teaching and planning lessons. Comparing the responses of informants of all groups (experimental group, control group1, and control group2) leads us to conclude that there is a statistically significant difference at (α= 0.05) for the effect of training platforms on science teachers' motivation towards teaching and planning lessons, in favour of the experimental group.

6.2.2 Evidence from standardised measures data

The main question that guides the study about the influence of the intervention on teachers' motivation is: What is the impact of using mobile technology as a training platform on science teachers' motivation towards teaching and planning lessons? As mentioned earlier in the Methodology chapter, it was decided to apply parametric methods if the data are found normally distributed, and apply nonparametric methods if the data are found not normally distributed.

Normality Test

The normality test (Shapiro and Wilk test) was conducted on the pre-test responses of the Omani science teachers who participated in the main study. The researcher found that data were not normally distributed in both instruments of motivation. The following table shows the normality test of motivation towards teaching:

Table 6.8: Tests of normality of motivation towards teaching

	Shapiro-Wilk		
	Statistic	df	Sig.
Pre-test motivation towards teaching	0.927	83	0.001

The Shapiro-Wilk test revealed that *p*-value equals 0.001 which is less than 0.05. Thus, the null hypothesis was rejected and data are not normally distributed.
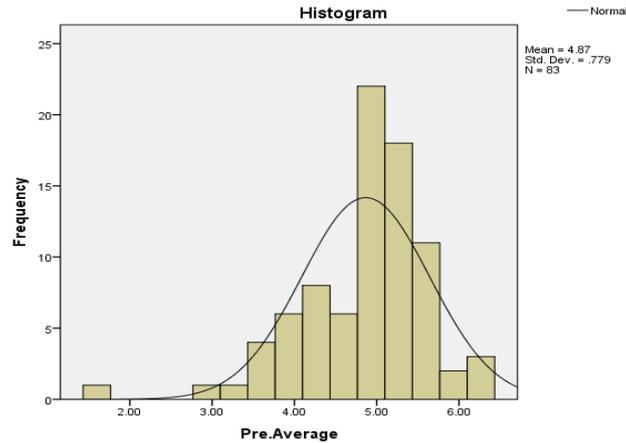
Figure 6.3: Histogram of pre-test (Motivation towards teaching)

Furthermore, the histogram chart above confirmed that the data are of negatively skewed distribution. In addition, according to the normal Q-Q Plot that is shown below, many data points are slightly further from the diagonal line. Therefore, these data are not normally distributed.
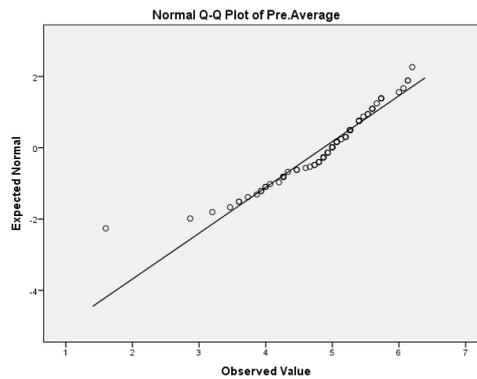
Figure 6.4: Normal Q-Q Plot (Motivation towards teaching)

In terms of motivation towards planning lessons, the normality test results are shown in the following table:

Table 6.9: Tests of normality of motivation towards planning lessons

	Shapiro-Wilk		
	Statistic	df	Sig.
Pre-test motivation towards planning lessons	0.968	83	0.036

The Shapiro-Wilk test revealed that p-value equals 0.036 which is less than 0.05. Thus, the null hypothesis was rejected and data are not normally distributed.

205
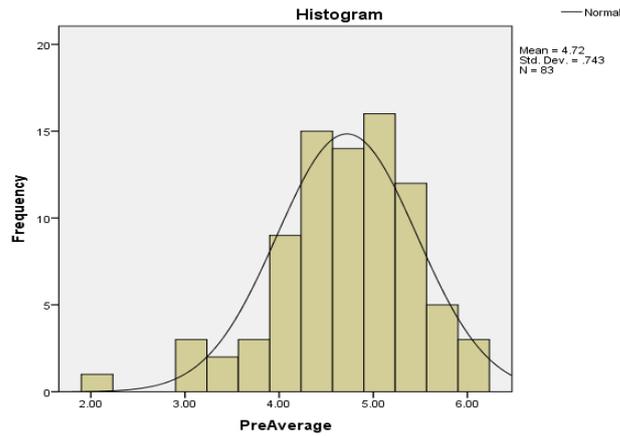
Figure 6.5: Histogram of pre-test (Motivation towards planning lessons)

Furthermore, the histogram chart above confirmed that the data are of negatively skewed distribution.
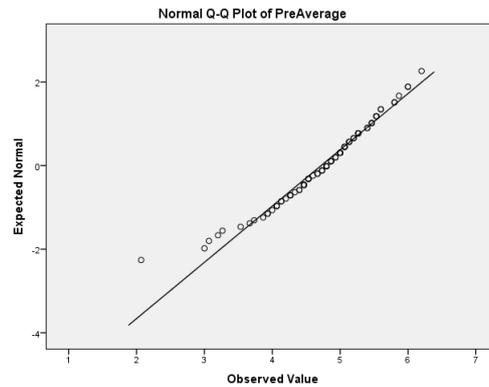
Figure 6.6: Normal Q-Q Plot (Motivation towards planning lessons)

In addition, according to the normal Q-Q Plot as shown above, many data points are slightly further from the diagonal line. Therefore, these data are not normally distributed. Table (6.10) shows the mean and standard deviation of all items of both instruments that measure teachers' motivation towards teaching and planning lessons according to groups (using mobile, workbooks, and diary cards) and time (pre-test and post-test).

Table 6.10: Mean and the Standard Deviation for the Pre-test and Post-test of All Items of both Instruments

	Group	Mean	Std. Deviation	N
Pre-motivation test towards teaching	Using Mobile	4.80	0.80	28
	Using Workbook	4.92	0.91	26
	Using diary cards	4.88	0.65	29
	Total	4.87	0.79	83
Post- motivation test towards teaching	Using Mobile	4.92	0.73	28
	Using Workbook	4.79	0.74	26
	Using diary cards	4.82	0.61	29
	Total	4.84	0.69	83
Pre-motivation test towards planning lessons	Using Mobile	4.63	0.72	28
	Using Workbook	4.74	0.90	26
	Using diary cards	4.79	0.62	29
	Total	4.72	0.74	83
Post- motivation test towards planning lessons	Using Mobile	5.02	0.67	28
	Using Workbook	4.69	0.68	26
	Using diary cards	4.87	0.75	29
	Total	4.87	0.71	83

According to the previous table, in terms of motivation towards teaching, the mean of the group that was using mobile applications increased from (M=4.80) to (M=4.92), and the mean of the group that was using workbooks decreased from (M=4.92) to (M=4.79), while no considerable changes were noticed in the control group2. However, in terms of motivation towards planning lessons, the mean of the group that used mobile applications increased from (M=4.63) to (M=5.02), while it is slightly different in the rest of the groups. The following graphs clarify this:
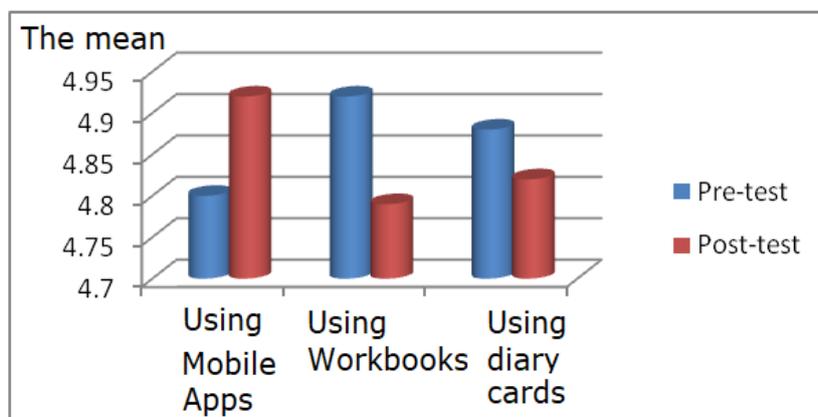
Figure 6.7: Pre-test and post-test scores for the three groups of the study (Motivation towards teaching)
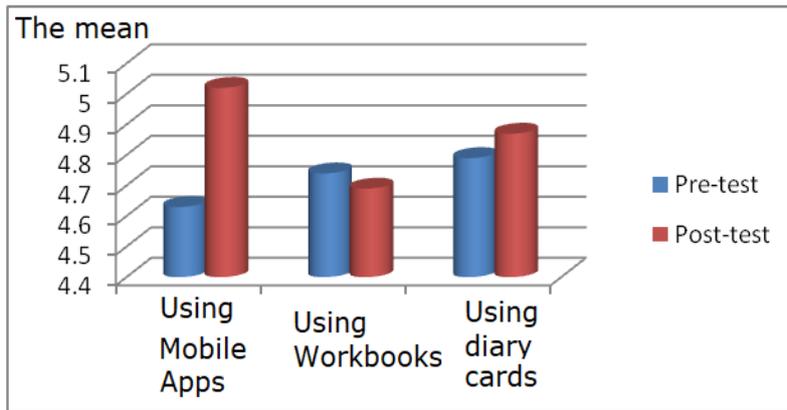
Figure 6.8: Pre-test and post-test scores for the three groups of the study (Motivation towards planning lessons)

Standardised measures data

The data provided by both instruments that assessed Omani science teachers' motivation towards teaching and planning lessons were not normally distributed. Thus, a non-parametric test known as a Friedman test was utilised to compare the results between the two conditions: pre-performances and post-performances. It compares the scores of the three related groups (using mobile, workbooks, and diary cards) on both instruments, as the following table shows:

Table 6.11: Friedman Test for both variables: Motivation towards teaching and towards planning lessons

	Friedman Test for Motivation towards teaching	Friedman Test for Motivation towards planning lessons
N	83	83
Chi-Square	0.62	2.39
df	1	1
Asymp. Sig.	0.431	0.122

The Friedman Test shows that the *p*-value in the case of motivation towards the teaching variable equals 0.431, and in the case of motivation towards planning lessons, the variable equals 0.122, which are both greater than the significance level (0.05). Thus, we conclude that the type of training platform does not have a significant effect on science teachers' motivation towards teaching or planning lessons. In other words, there are no significant differences in the mean scores of the science teachers' motivation towards teaching or planning lessons in the two conditions (pre-test and post-test) across the three

different groups (using mobile apps, workbooks, or diary cards). Friedman, in the case of motivation towards teaching is, $\chi 2$ (n=83) = 0.62, p= 0.431, whereas Friedman, in the case of motivation towards planning lessons is, $\chi 2$ (n=83) = 2.39, p= 0.122.

Each of these two instruments consists of five components: Intrinsic motivation, Identified Regulation motivation, Introjected Regulation motivation, External Regulation, and Amotivation. Table (6.12) below shows the mean and standard deviation of all components of both instruments that measure teachers' motivation towards teaching and planning lessons, according to the groups (using mobile, workbooks, and diary cards) and time (pre-test and post-test).

Table 6.12: Mean and the Standard Deviation for the Pre-test and Post-test of both instruments components

variables	Components	Using Mobile Apps		Using Workbooks		Using Diary Cards	
		M	SD	M	SD	M	SD
Motivation towards teaching	Pre-Intrinsic	5.75	1.16	5.92	1.42	5.93	1.06
	Post-Intrinsic	6.08	1.26	5.92	0.78	5.61	1.28
	Pre-Identified R	6.29	0.98	6.40	1.14	6.32	0.77
	Post-Identified R	6.45	0.93	6.35	0.80	6.24	0.87
	Pre-Introgected R	5.43	1.62	6.00	1.32	5.64	1.43
	Post-Introgected R	5.40	1.74	5.53	1.69	5.74	1.39
	Pre-External	4.56	1.46	4.23	1.48	4.29	1.38
	Post-External	4.87	1.48	4.21	1.38	4.46	1.36
	Pre-Amotivation	1.99	1.11	2.04	1.40	2.22	1.43
	Post-Amotivation	1.68	0.69	1.94	1.37	2.05	1.29
	Pre-Mean Total	4.80	0.80	4.92	0.91	4.88	0.65
	Post-Mean Total	4.92	0.73	4.79	0.74	4.82	0.61
		M	SD	M	SD	M	SD
Motivation towards planning lessons	Pre-Intrinsic	5.08	1.33	5.08	1.55	5.29	1.12
	Post-Intrinsic	6.11	0.71	5.32	1.14	5.25	1.04
	Pre-Identified R	5.74	1.50	5.97	1.26	6.21	0.76
	Post-Identified R	6.43	0.78	5.95	1.00	6.13	0.87
	Pre-Introgected R	5.25	1.65	5.38	1.68	5.77	1.08
	Post-Introgected R	5.35	1.63	5.26	1.83	5.86	1.08
	Pre-External	4.57	1.32	4.56	1.32	4.47	1.36
	Post-External	4.95	1.35	4.56	1.36	4.77	1.46
	Pre-Amotivation	2.52	1.48	2.71	1.55	2.20	1.35
	Post-Amotivation	2.29	1.23	2.35	1.47	2.34	1.67
	Pre-Mean Total	4.63	0.72	4.74	0.90	4.79	0.62
	Post-Mean Total	5.02	0.67	4.69	0.68	4.87	0.75

The table (6.12), in general, shows that in terms of the group that used mobile applications as a training platform, there is a positive change in the mean between the pre and post scores in almost all instrument components, except for the Amotivation component, where the change is negative. This is the case for both dependent variables: motivation towards teaching, and motivation towards planning lessons. In contrast, both other groups, the group which used workbooks and the group which used diary cards, have negative differences in most instruments' components. This result clearly indicates that using mobile technology has a positive impact on science teachers' motivation towards teaching and towards planning lessons. However, are these differences significant? The Friedman tests were established for each component in order to answer this question, and the table below shows the results of these tests for both dependant variables (motivation towards teaching and motivation towards planning lessons).

Table 6.13: Friedman Test for both dependent variables: motivation towards teaching and motivation towards planning lessons

The components	Statistics	Friedman Test for Motivation towards teaching	Friedman Test for Motivation towards planning lessons
Intrinsic	Chi-Square	0.062	4.813
	Asymp. Sig.	0.803	**0.028**
Identified Regulation	Chi-Square	0.071	1.754
	Asymp. Sig.	0.789	0.185
Introjected Regulation	Chi-Square	0.148	0.242
	Asymp. Sig.	0.701	0.622
External	Chi-Square	0.889	1.471
	Asymp. Sig.	0.346	0.225
Amotivation	Chi-Square	5.667	0.143
	Asymp. Sig.	**0.017**	0.705
Mean total	Chi-Square	0.620	2.390
	Asymp. Sig.	0.431	0.122

The results of these tests show that the p-value, in the case of teachers' motivation towards teaching variable, is significant only regarding the Amotivation component (p=0.017), but it is not significant in all other components. In other words, there is a significant difference in the mean scores of the science teachers' motivation towards teaching (only in the Amotivation component) in the two conditions (pre-test and post-test) across the three different groups (using mobile, workbooks, and diary cards), the Friedman

(Amotivation component) $\chi 2$ (n=83) = 5.667, p= 0.017. In order to determine which of the three groups differed significantly, another test called Wilcoxon matched-pairs signs-test was used, and the results of this test are as follows:

Table 6.14: Wilcoxon matched-pairs signs-test (Amotivation component)

	Using mobile (post-amotivation – pre-amotivation)	Using workbooks (post-amotivation – pre-amotivation)	Using diary cards (post-amotivation – pre-amotivation)
Z	-2.20	-0.40	-0.55
Asymp. Sig. (2-tailed)	**0.03**	0.69	0.59

The Wilcoxon test shows that the group that used mobile applications as a training platform differed significantly (p=0.03) than the other two groups in regard to the component of Amotivation. This leads to the conclusion that using mobile applications as a training platform has a positive impact on this component in terms of teachers' motivation towards teaching. This means that the engagement of Omani science teachers in the programme using mobile applications reduces significantly the decline in their motivation towards teaching, Wilcoxon, z (n=28) = -2.20, two-tailed p= 0.03.

On the other hand, the p-value is significant only in the case of the Intrinsic component (p=0.028) in the instrument that assesses teachers' motivation towards planning lessons. This means that there is a significant difference in the mean scores of the science teachers' motivation towards planning lessons (only in Intrinsic component) in the two conditions (pre-test and post-test) across the three different groups (using mobile, workbooks, and diary cards), Friedman (Intrinsic component) $\chi 2$ (n=83) = 4.813, p= 0.028. The Wilcoxon test shows that the group which used mobile applications as a platform differed significantly than the other two groups in regard to intrinsic component, Wilcoxon, z (n=28) = -3.07, two-tailed p=0.002. This result revealed that using mobile applications as a training platform has a positive impact on the intrinsic component, in terms of motivation towards planning lessons. This means that the engagement of Omani science teachers in a group which uses mobile applications significantly increases teachers' interests and enjoyment in the planning lessons task. The following table (6.15) shows this result:

Table 6.15: Wilcoxon matched-pairs signs-test (Intrinsic component)

	Using mobile (post-intrinsic – pre-intrinsic)	Using workbooks (post-intrinsic – pre-intrinsic)	Using diary cards (post-intrinsic – pre-intrinsic)
Z	-3.07	-0.93	-0.32
Asymp. Sig. (2-tailed)	**0.002**	0.352	0.750

Conclusion

The type of training platform does not have a significant effect on science teachers' motivation towards teaching or towards planning lessons. In other words, there are no significant differences in the mean scores of the science teachers' motivation towards teaching or towards planning lessons in the two conditions (pre-test and post-test) across the three different groups (using mobile apps, workbooks, and diary cards). However, the group that used mobile applications as a training platform differed significantly than the other two groups in the component of amotivation (in the case of motivation towards teaching) and in the intrinsic component (in the case of motivation towards planning lessons). This means that the engagement of Omani science teachers in a group which uses mobile applications reduces significantly the decline in their motivation towards teaching and increases significantly their interests and enjoyment in the planning lessons task.

6.2.3 Evidence from participants' activities

Introduction

This section presents the analysis of the activities of the study. It starts with calculating the difference in expectations ($Q_B – Q_A$) between the experimental group and control group1. It then shows the participants' estimations of the values of activities that they implemented.

Difference in expectations ($Q_B – Q_A$)

In order to explore the enhancement of Omani science teachers' motivation after using Facebook and Twitter as platforms, or after using a workbook, we need first to obtain the difference in marks between question $_B$ and question $_A$ ($Q_{B \text{ (Expectancy beliefs)}} – Q_{A \text{ (Ability beliefs)}}$) which represents the first part (Expectancy) of the motivation theory (Expectancy-Value Theory) that was adopted by this study. As mentioned previously in the methodology chapter, after obtaining this difference in both groups (experimental and control group1) the

comparison between these groups is conducted by the use of the Mann Whitney U. This comparison is shown in the table below:

Table 6.16: Mann Whitney U results for the difference in expectations ($Q_B - Q_A$)

Activity	Using mobile applications			Using Workbooks			Mann Whitney U	Z	Asymp. Sig. (2-tailed)
	N	Mean Score	Sum of Ranks	N	Mean Score	Sum of Ranks			
1	18	18.56	334.00	17	17.41	296.00	143.00	-0.354	0.723
2	21	21.62	454.00	18	18.11	326.00	155.00	-1.063	0.288
3	19	19.66	373.50	17	17.21	292.50	139.50	-0.760	0.447
4	17	18.47	314.00	18	17.56	316.00	145.00	-0.299	0.765
5	17	15.76	268.00	16	18.31	293.00	115.00	-0.811	0.417
6	19	20.45	388.50	20	19.58	391.50	181.50	-0.272	0.786
7	17	16.38	278.50	14	15.54	217.50	112.50	-0.265	0.791
9	20	21.83	436.50	18	16.92	304.50	133.50	-1.442	0.149
10	19	20.55	390.50	18	17.36	312.50	141.50	-1.038	0.299
11	18	20.86	375.50	18	16.14	290.50	119.50	-1.473	0.141
12	19	19.21	365.00	19	19.79	376.00	175.00	-.176	0.860

Overall, the mean score in the table above shows that the experimental group participants are slightly better in improving their ability to implement the suggested teaching practices, than their counterparts in the control group1. This may lead to the argument that using mobile application (Facebook and Twitter) as a training platform increases the expectancy of teachers regarding their ability to teach and to plan lessons. However, as the previous table shows, the Mann-Whitney U tests indicate that these differences are not significant in all activities. The following graph represents the differences between the experimental group (using mobile applications) and control group1 (using workbook) in their teaching and planning lessons ability expectation:
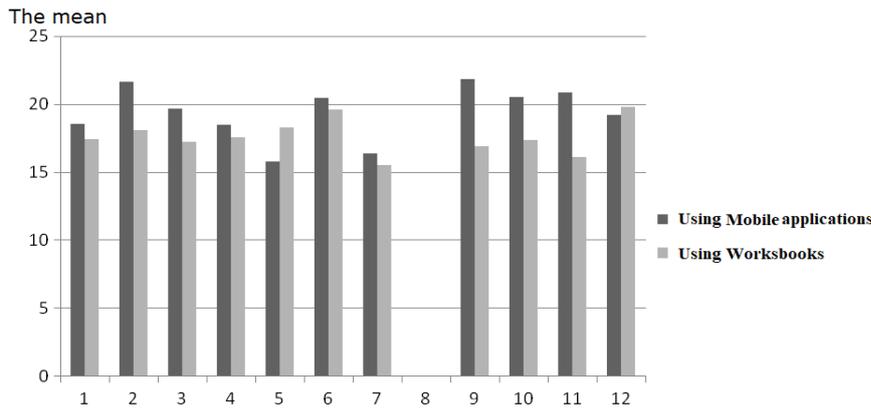
Figure 6.9: The differences between experimental group and control group1 in their teaching and planning lessons ability expectation

Participants' estimations of the values of activities

The Mann Whitney U Tests were used again in order to compare the responses of the participants in both groups, experimental group and control group1, regarding the last question of the activities (representing the second part of the Expectancy-Value Theory). These tests aim to show if there are any significant differences between participants of both groups regarding their estimation of the values of the activities. The following tables show these differences for all values (utility value, attainment value, intrinsic value, and cost value) if they occur:

1- The utility value

Table 6.17: Mann Whitney U results for the participants' evaluation for the utility value

Activity	Using mobile applications			Using Workbooks			MannWhitney U	Z	Asymp. Sig. (2-tailed)
	N	Mean scores	Sum of Ranks	N	Mean scores	Sum of Ranks			
1	18	26.28	473.00	24	17.92	430.00	130.000	-2.251	**0.024**
2	22	22.57	496.50	21	21.40	449.50	218.500	-0.321	0.748
3	20	29.10	582.00	24	17.00	408.00	108.000	-3.259	**0.001**
4	18	23.53	423.50	23	19.02	437.50	161.500	-1.294	0.196
5	21	24.24	509.00	23	20.91	481.00	205.000	-0.891	0.373
6	20	23.08	461.50	21	19.02	399.50	168.500	-1.139	0.255
7	22	20.73	456.00	21	23.33	490.00	203.000	-0.709	-0.709
9	23	25.78	593.00	21	18.90	397.00	166.000	-1.881	0.060
10	18	23.08	415.50	22	18.39	404.50	151.500	-1.342	0.180
11	21	19.19	403.00	20	22.90	458.00	172.000	-1.034	0.301
12	19	18.89	359.00	20	21.05	421.00	169.000	-0.616	0.538

The table (6.17), and the chart below, show that the experimental group generally has a higher evaluation degree regarding the activities' utility value. The differences between both groups in their mean scores are significant in two cases: activity 1 (the mean scores of the experimental group and control group1 are 26.28 and 17.92, respectively; U=130, Z = -2.251, $p < 0.05$, r=0.024) and activity 3 (the mean scores of experimental group and control group1 are 29.10 and 17.00, respectively; U= 108, Z = -3.259, $p < 0.05$, r=0.001). However, it seems that at the end of the programme, the control group1 gave a better degree of estimation regarding this value.
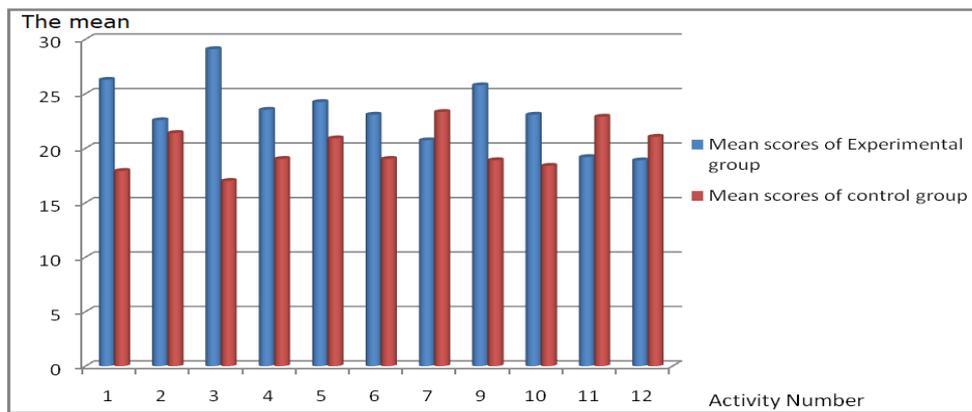
Figure 6.10: Comparison between both groups regarding the mean scores of the utility value

2- **The attainment value**

Table 6.18: Mann Whitney U results for the participants' evaluation for the attainment value

Activity	Using mobile applications			Using Workbooks			MannWhitney U	Z	Asymp. Sig. (2-tailed)
	N	Mean scores	Sum of Ranks	N	Mean scores	Sum of Ranks			
1	18	24.39	439.00	21	16.24	341.00	110.000	-2.310	**0.021**
2	22	20.43	449.50	19	21.66	411.50	196.500	-0.340	0.734
3	20	25.25	505.00	24	20.21	485.00	185.000	-1.366	0.172
4	18	23.61	425.00	22	17.95	395.00	142.000	-1.574	0.116
5	21	21.07	442.50	22	22.89	503.50	211.500	-0.501	0.616
6	20	22.20	444.00	21	19.86	417.00	186.000	-0.656	0.512
7	22	18.43	405.50	20	24.88	497.50	152.500	-1.811	0.070
9	23	21.61	497.00	21	23.48	493.00	221.000	-0.515	0.607
10	18	19.94	359.00	21	20.05	421.00	188.000	-0.030	0.976
11	21	17.43	366.00	19	23.89	454.00	135.000	-1.813	0.070
12	19	18.29	347.50	20	21.63	432.50	157.500	-0.952	0.341

Both the table (6.18), and the chart below indicate that the experimental group is slightly better in evaluating the attainment value at the beginning of the programme, but the degree of that evaluation decreases as the number of the achieved activities increases. In contrast, the degree of evaluation of this value increases in the case of control group1, as the number of the achieved activities increases. The differences between both groups in their mean scores are generally not significant except in case of activity1 (the mean scores of experimental group and control group1 are 24.39 and 16.24, respectively; $U = 110$, $Z = -2.310$, $p < 0.05$, $r = 0.021$) where the experimental group degree of evaluation regarding this value is higher than the control group1.
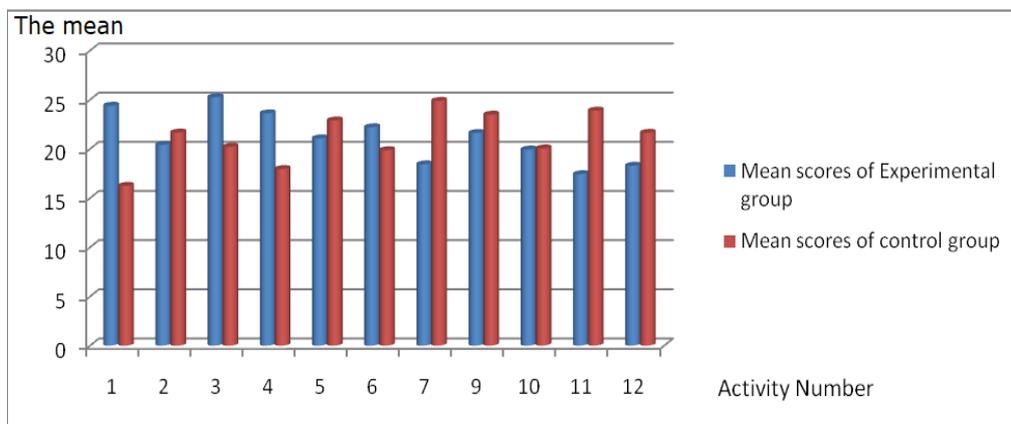
Figure 6.11: Comparison between both groups regarding the mean scores of the attainment value.

3- The intrinsic value

Table 6.19: Mann Whitney U results for the participants' evaluation for the intrinsic value

Activity	Using mobile applications			Using Workbooks			MannWhitney U	Z	Asymp. Sig. (2-tailed)
	N	Mean scores	Sum of Ranks	N	Mean scores	Sum of Ranks			
1	18	22.14	398.50	21	18.17	381.50	150.500	-1.122	0.262
2	22	21.41	471.00	20	21.60	432.00	218.000	-0.052	0.958
3	20	25.03	500.50	23	19.37	445.50	169.500	-1.522	0.128
4	18	22.14	398.50	23	20.11	462.50	186.500	-0.563	0.574
5	21	26.36	553.50	23	18.98	436.50	160.500	-2.065	**0.039**
6	20	25.30	506.00	21	16.90	355.00	124.000	-2.362	**0.018**
7	22	19.30	424.50	21	24.83	521.50	171.500	-1.502	0.133
9	23	22.78	524.00	21	22.19	466.00	235.000	-0.168	0.867
10	18	20.94	377.00	21	19.19	403.00	172.000	-0.514	0.607
11	21	19.71	414.00	20	22.35	447.00	183.000	-.743	0.457
12	19	18.61	353.50	20	21.33	426.50	163.500	-0.775	0.439

Both the table above, and the following chart show that the degree of the activities' evaluation of the experimental group regarding the intrinsic value decreases over time. In the first six activities, the degree of their evaluation was higher than its corresponding group (control group). Then, it becomes almost the same over the time. The differences between the mean scores of both groups are significant only in activities 5 (the mean scores of experimental group and control group1 are 26.36 and 18.98, respectively; $U = 160$, $Z = -2.065$, $p < 0.05$, $r = 0.039$), and 6 (the mean scores of experimental group and control group1 are 25.30 and 16.90, respectively; $U = 124$, $Z = -2.362$, $p < 0.05$, $r = 0.018$).
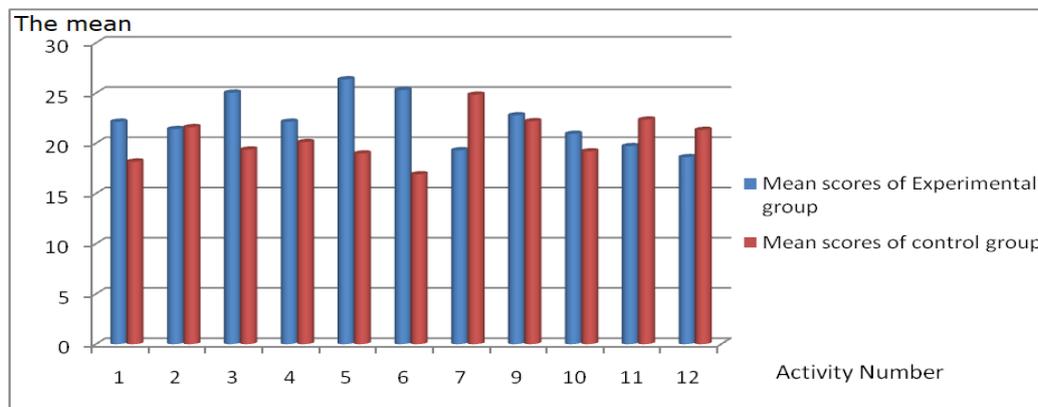
Figure 6.12: Comparison between both groups regarding the mean scores of the intrinsic value

4- The cost value

Table 6.20: Mann Whitney results for the participants' evaluation for the cost value

Activity	Using mobile applications			Using Workbooks			MannWhitney U	Z	Asymp. Sig. (2-tailed)
	N	Mean scores	Sum of Ranks	N	Mean scores	Sum of Ranks			
1	17	24.15	410.50	22	16.80	369.50	116.500	-2.052	**0.040**
2	22	19.32	425.00	19	22.95	436.00	172.000	-1.013	0.311
3	18	22.94	413.00	23	19.48	448.00	172.000	-0.947	0.344
4	18	21.83	393.00	22	19.41	427.00	174.000	-0.673	0.501
5	20	20.73	414.50	23	23.11	531.50	204.500	-0.654	0.513
6	20	19.65	393.00	20	21.35	427.00	183.000	-0.483	0.629
7	21	19.67	413.00	21	23.33	490.00	182.000	-0.990	0.322
9	22	21.07	463.50	20	21.98	439.50	210.500	-0.252	0.801
10	17	20.26	344.50	22	19.80	435.50	182.500	-0.134	0.893
11	20	18.83	376.50	20	22.18	443.50	166.500	-0.945	0.345
12	18	16.97	305.50	19	20.92	397.50	134.500	-1.152	0.249

Both the table above, and the chart below indicate that the differences in the mean scores between the experimental group and control group1 are significant in the first activity only (the mean scores of experimental group and control group1 are 24.15 and 16.80, respectively; U = 116, Z = -2.052, p < 0.05, r = 0.040) where the experimental group thinks that doing this activity is more costly than in the case of control group1. The table and the chart also indicate that implementing the activities becomes more costly for control group1 over time, while this is not the case in terms of the experimental group.
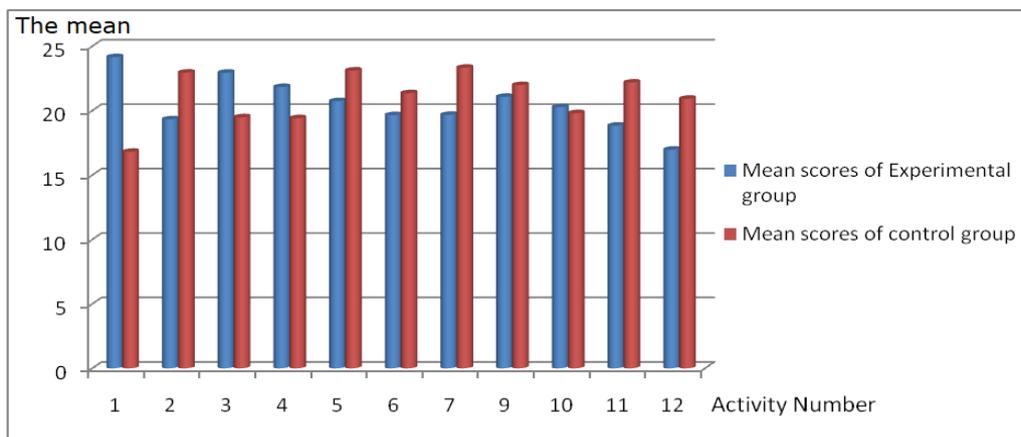
Figure 6.13: Comparison between both groups regarding the mean scores of the cost value

Conclusion

In all cases (the utility value, the attainment value, and the intrinsic value), except in the case of the cost value, the results show that the experimental group participants' estimations are generally higher than the control group1. This may suggest that using mobile applications as a training platform increases teachers' estimations regarding the values of teaching skills and planning skills. As a consequence, it may increase the chances of improving their motivation towards teaching and planning lessons.

6.3 Summary of the chapter

According to the mean of both motivation instruments items, it seems that Omani science teachers' motivation towards teaching and planning lessons is at a level higher than medium, according to a seven-point Likert scale. The highest component of motivation in both instruments of motivation is the Identified Regulation component, which is a part of extrinsic motivation. The interview data support these findings.

There is a statistically significant difference attributed to gender among Omani science teachers, regarding their motivation towards planning lessons in favour of Omani female science teachers. The results show that, in general, Omani female science teachers are better in their motivation towards teaching and planning lessons than Omani male science teachers. The results also show that the stratum of Omani male science teachers who teach at urban schools and have short years of experience is the worst stratum in terms of the level of their motivation towards teaching and towards planning lessons.

Comparing the responses of informants of all groups (experimental group, control group1, and control group2) led to the conclusion that there is a statistically significant difference in the effect of training platforms on science teachers' motivation towards teaching and planning lessons, in favour of the experimental group. The analysis of the activities of the study also shows that, in general, using mobile applications as a training platform for enhancing teachers' motivation towards teaching or towards planning lessons is slightly better than using workbooks. However, the standardised measured data show that there are no significant differences in the mean scores of the science teachers' motivation towards teaching or towards planning lessons in the two conditions (pre-test and post-test) across the three different groups (using mobile apps, using workbooks, using diary cards). Note the standardised measurement data show that in case of teachers' motivation towards teaching, the group that used mobile applications as a training platform differed significantly ($p=0.03$)

than the other two groups in regard to the Amotivation component. While in case of teachers' motivation towards planning lessons, the group that used mobile applications as a training platform differed significantly (p=0.028) than the other two groups in regard to the Intrinsic component.

Chapter Seven: Influences on Teachers' Reflective Practices and their Motivation

Introduction

This chapter focuses on the influences that affect Omani science teachers' reflective practices and their motivation towards working as teachers based on their perspectives. It is divided into two sections. The first section examines the relationship between reflective practices and motivation, and whether they may affect each other. The next section explores teachers' views on the influences that affect their reflective practices, and their motivation towards working as teachers.

7.1 Relationship between science teachers' reflective practices and their motivation

The current study has revealed the relationship between science teachers' reflective practices and their motivation towards teaching and planning lessons. The research questions in relation to this aspect were:

- Is there any significant association between science teachers' reflective practices and their motivation towards teaching?
- Is there any significant association between science teachers' reflective practices and their motivation towards planning lessons?

According to the interview data, there is a sign that some informants think that there is a relationship between teachers' reflective practices and their motivation. For example, Omani-tc teacher stated, when he was asked about the factors that affect teachers' reflective practices, *"It depends on the aim of a teacher from being a teacher. Do they have enough motivation and desire to be a good teacher"*? Another teacher (Omania-yt) said that it depends on *"teachers' desire to be excellent and the extent to which they have motivation"*. Further, Omania-f teacher and Omania-l teacher both considered motivation towards teaching to be a crucial factor to enhance teachers' reflective practices. However, the researcher could not consider these signs as strong evidence towards supporting the claim that there is a relationship between teachers' reflective practices and their motivation. Thus, he decided to also rely on baseline data in order to support this evidence.

The current study utilised the Spearman test which is a non-parametric test to illustrate these relationships. This action was implemented because the Pearson test assumptions (type of a parametric test) were violated since both dependent variables (science

teachers' reflective practices and their motivation towards teaching and towards planning lessons) contain ordinal data. In addition, the data of motivation towards the teaching variable and also towards the planning lessons variable were not normally distributed. The normality tests show this fact, and thus the non-parametric test (Spearman test) is the right choice for the correlation analysis. The following tests of normality prove this claim:

7.1.1 Normality tests

Reflective practice variable

The table below shows the results of two tests of normality, the Kolmogorov-Smirnov Test and the Shapiro-Wilk Test. The data are normally distributed only if the test is not significant ($p>0.05$), but if the test is significant ($p<0.05$), then the data are not normally distributed (Field, 2000).

Table 7.1: Tests of Normality (Reflective practice)

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Average of Questionnaire	0.072	150	0.056	0.986	150	0.144

In general, *"the Shapiro-Wilk test is considered more accurate"* (Field, 2000, p.51) and *"better than the previous one"* (Marques de sa, 2007, p.188) since *"it has more power to detect differences from normality"* (Field, 2012, p.188). As the Shapiro-Wilk test shows, *p*-value equals 0.144 which is greater than 0.05. Thus, the null hypothesis is accepted and the data are considered normally distributed.
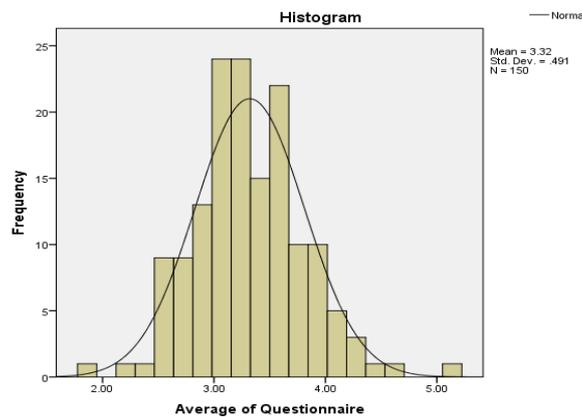
Figure 7.1: Histogram of pre-test (Reflective practice)

Furthermore, the histogram chart above confirms the normality, since its peak in the middle is approximately symmetrical. In addition, according to a normal Q-Q Plot, the data

points are mostly close to the diagonal line. Therefore, theses data are clearly normally distributed.
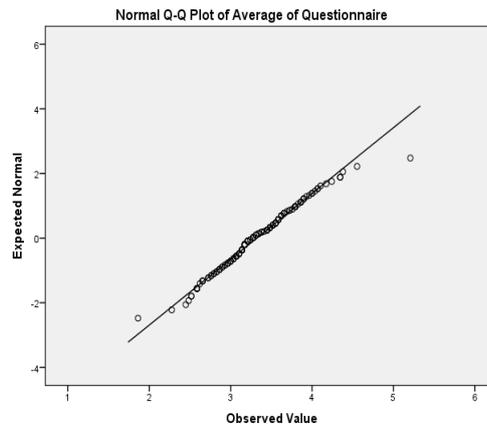
Figure 7.2: Normal Q-Q Plot (Reflective practice)

Motivation towards teaching variable

The table below shows the results of the test of normality, the Shapiro-Wilk Test.

Table 7.2: Tests of Normality (Motivation towards teaching)

	Shapiro-Wilk		
	Statistic	df	Sig.
Average of Questionnaire	0.957	150	0.001

As the Shapiro-Wilk test shows, p-value equals 0.001 which is less than 0.05, thus, the null hypothesis is rejected and the data are not considered to be normally distributed.
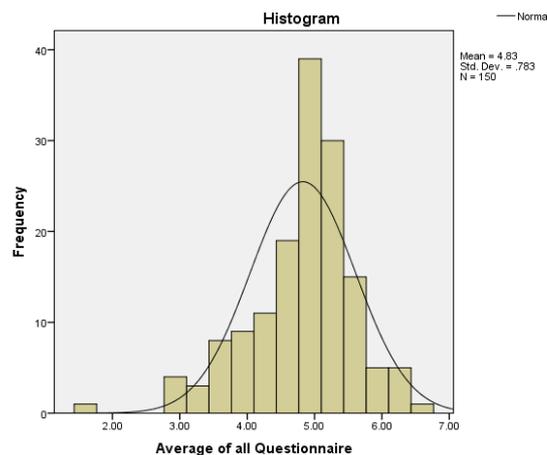
Figure 7.3: Histogram of pre-test (Motivation towards teaching)

The histogram chart clearly shows a skewed right (non-symmetric) distribution which confirms that these data are not normally distributed. In addition, according to a normal Q-Q

Plot, some data points are placed slightly away from the diagonal line. Therefore, these data are clearly not normally distributed.
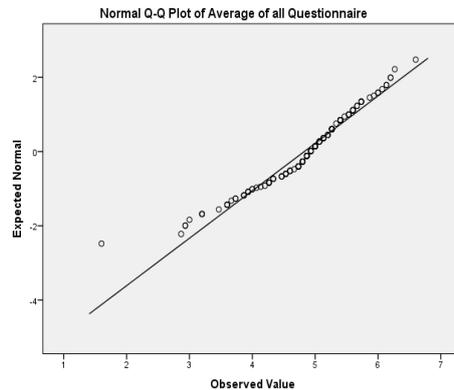
Figure 7.4: Normal Q-Q Plot (Motivation towards teaching)

Motivation towards planning lessons variable

The table below shows the results of the test of normality, the Shapiro-Wilk Test.

Table 7.3: Tests of Normality (Motivation towards planning lessons)

	Shapiro-Wilk		
	Statistic	df	Sig.
Average of Questionnaire	0.979	150	0.024

The Shapiro-Wilk test shows *p*-value equals 0.024 which is less than 0.05, thus, the null hypothesis is rejected and the data are not considered to be normally distributed.
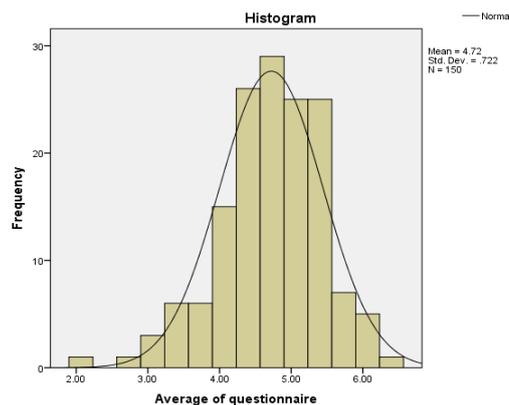
Figure 7.5: Histogram of pre-test (Motivation towards planning lessons)

Furthermore, the histogram chart clearly shows a skewed right (non-symmetric) distribution confirming that these data are not normally distributed. In addition, according to a normal Q-Q Plot, some data points are placed slightly away from the diagonal line. Therefore, these data are clearly not normally distributed.
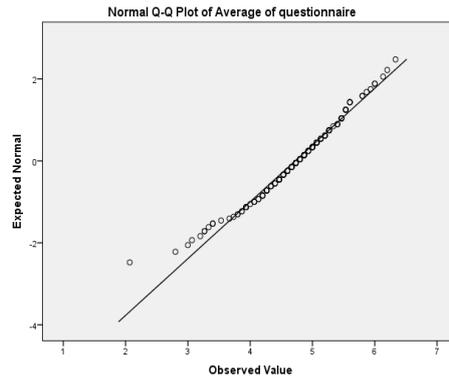
Figure 7.6: Normal Q-Q Plot (Motivation towards planning lessons)

Since the data of both variables, teachers' motivation towards teaching and teachers' motivation towards planning lessons, are not normally distributed, and thus have violated parametric assumptions, it was decided to conduct the Spearman correlation coefficient test for the purpose of the correlation analysis. The table below reveals the result regarding the relationship between science teachers' reflective practices and their motivation towards teaching:

Table 7.4: The relationship between reflective practice and motivation towards teaching

			Mean of reflective practices	Mean of motivation towards teaching
Spearman's rho	Mean of reflective practices	Correlation Coefficient	1.000	0.157
		Sig. (2-tailed)	-	**0.056**
		N	150	150
	Mean of motivation towards teaching	Correlation Coefficient	0.157	1.000
		Sig. (2-tailed)	**0.056**	-
		N	150	150

As the table indicates, there is barely above the level of significant association ($p= 0.050$) between science teachers' reflective practices and their motivation towards teaching (N= 150, $r= 0.157$, $p= 0.056$). This lack of ability to detect the presence of statistical significance could be explained due to the sample size (Figueiredo Filho, 2013). *"The larger the sample size, the higher the probability of detecting statistical significance"* (Figueiredo Filho, 2013, p.44).

225

On the other hand, the Spearman correlation coefficient test has been conducted again in order to explore the relationship between science teachers' reflective practices and their motivation towards planning lessons. The table below reveals the result:

Table 7.5: The relationship between reflective practice and motivation towards planning lessons

			Mean of reflective practices	Mean of motivation towards planning lessons
Spearman's rho	Mean of reflective practices	Correlation Coefficient	1.000	**0.170**
		Sig. (2-tailed)	-	**0.038**
		N	150	150
	Mean of motivation towards planning lessons	Correlation Coefficient	**0.170**	1.000
		Sig. (2-tailed)	**0.038**	-
		N	150	150

As the table indicates, there is a statistically significant positive and weak relationship between science teachers' reflective practices and their motivation towards planning lessons (N = 150, r = 0.170, p = 0.038).

Note: the researcher also conducted the Spearman correlation coefficient test in order to explore the relationship between science teachers' motivation towards teaching and their motivation towards planning lessons. It was found that there is a statistically significant positive and strong relationship between science teachers' motivation towards teaching and their motivation towards planning lessons (N = 150, r = 0.69, p = 0.001).

Conclusion

In conclusion, there is apparently a weak but significant correlation between teachers' reflective practices and their motivation towards planning lessons. However, the correlation is statistically insignificant, barely above the level of significant (p= 0.050), in the case of the relationship between teachers' reflective practices and their motivation towards teaching.

7.2 Influences affecting Reflective Practices and Motivation

Revealing influences behind Omani science teachers' levels of reflective practice and their motivation towards teaching, is one of the forces that encouraged the researcher to conduct this study. The question regarding this aspect is - What are the key influences associated with science teachers' levels of reflective practice and their motivation for working as teachers?

7.2.1 Teachers' views on influences that affect their reflective practices and motivation

The interview data were the only source of evidence used to answer the previous question. During these interviews, the informants mentioned many of the influences that orient their behaviours as teachers. These influences also control their reflective practices and motivation towards teaching. For example, time to read, time to reflect, teachers' workloads and reinforcing teachers morally and financially. Applying the thematic methods in analysing the interviews was the key method used to discover an answer for this question. Data had been organised, and the electronic files had been imported into Nvivo software. Then, the phases stated by Braun and Clarke (2006) were followed (See p.113-114).

7.2.1.1 Themes of the interviews

The initial themes that form a coherent pattern are presented through the following graph that was prepared using the Nvivo project maps feature.

Initial themes after analysing the interview
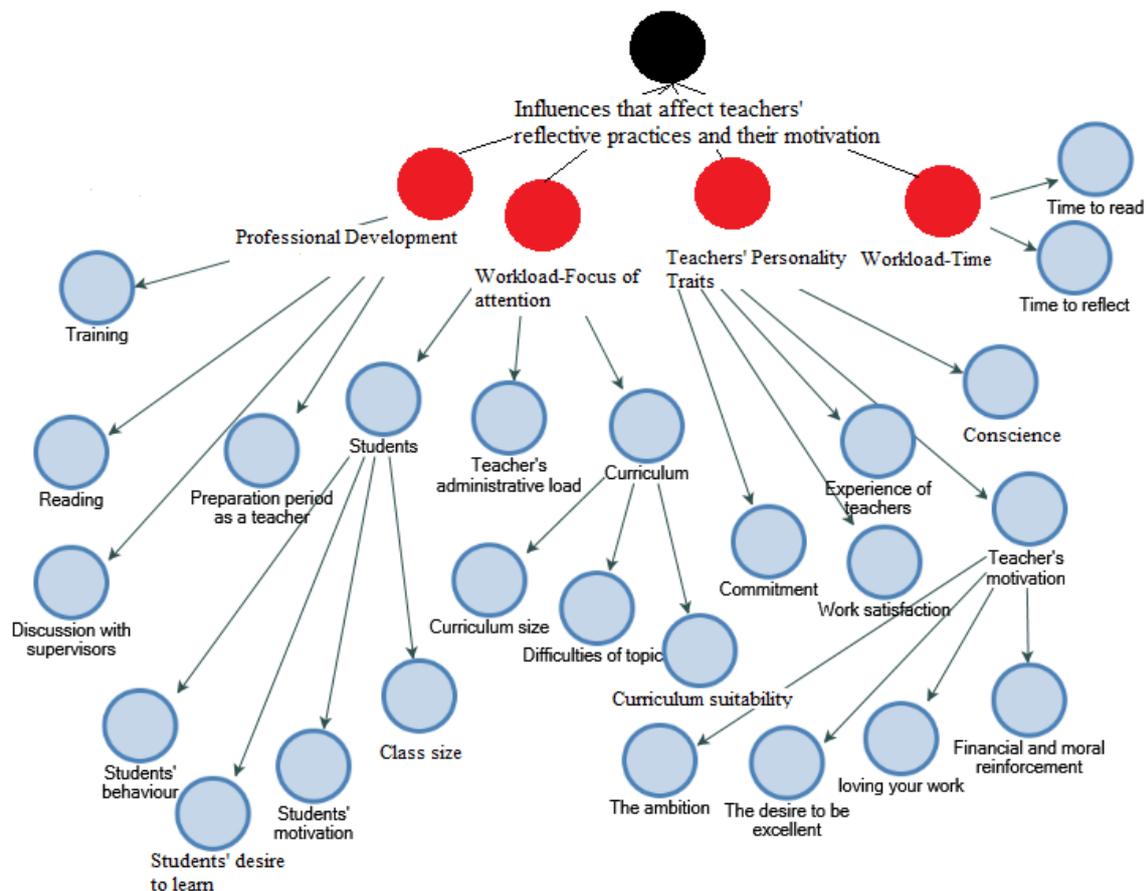
Figure 7.7: Initial themes after analysing the interview

It appears from the previous graph that four main themes - professional development, workload-focus of attention, workload-time, and teachers' personality traits - are the main influences that might be the answer to the questions of the study regarding the reasons behind the levels of science teachers in reflective practices and their motivation towards teaching. However, the researcher found after more reflection on the data (interview data) that a sub-theme, known as the *ability to form a good relationship with administration and colleagues*, could be added to the teachers' personality traits theme. A sub-theme known as a *lack in teaching aids*, could be also added to the workload-focus of attention theme. Furthermore, a second sub-theme referred to as *curriculum suitability* could be deleted from the sub-theme known as *curricula*, since it had been referred to by one informant only. Therefore, as a result of this reflections stage, the initial themes have been modified.

The following table represents the final themes which give indications for informants' perspectives about the influences that affect their reflective practices and their motivation towards teaching:

Table 7.6: Final form of the study's main themes and sub-themes

Main Theme	Sub- Themes	Second Sub- Themes
1. Professional development	1.1 Teachers' preparation. 1.2 Discussion with supervisors. 1.3 Reading in literature. 1.4 Training.	
2. Workload-Focus of attention	2.1 Curriculum.	Curriculum size/Difficulties of topics
	2.2 Students.	Class size/ Students' behaviours/ Students' motivation/ Students' desire to learn.
	2.3 Lack in teaching aids. 2.4 Teaching hours per week. 2.5 Administrative duties.	
3. Workload-Time	3.1 Time to read. 3.2 Time to reflect.	
4. Teachers' personality traits	4.1 Teachers' motivation.	The ambition/The desire to be excellent/love of work/Financial and moral reinforcement.
	4.2 Teachers' conscience. 4.3 Teachers' commitment. 4.4 Work satisfaction. 4.5 Experience of teachers. 4.6 Ability to form a good relationship with administration and colleagues.	

The table (7.6) shows that, according to the findings of the interview analysis, professional development, workload-focus of attention, workload-time, and teachers' personality traits are the main influences that may control the levels of Omani science teachers' reflective practices and their motivation towards teaching.

Theme 1: Professional Development

According to the interview data, the majority of informants felt that they did not possess sufficient educational knowledge about reflective practices. Some of them had not heard this term before at all. Omani science teachers attributed this to several reasons - *their preparation programmes for teaching, their discussions with inspectors, their lack of reading literature, and their training (as in-service teachers).* These reasons/sub-themes could be placed under a theme known as *professional development*.

Professional development plays a vital role, according to the informants' perspectives, in promoting reflective practice approaches. Some informants, who have a long period of years of experience, clearly interpreted their inability to define the term *reflective practices* as being due to their preparation as a teacher or because of their inspectors. One of them said: *"I have never heard about it, no one during the period of preparing us as a teacher, or during the discussion with inspectors has talked about it"* (Omani-n teacher). Another female informant attributed this lack of knowledge of the term *reflective practice* to her area of reading interests. She said: *"I basically read about scientific topics"* (Omania-A_3 teacher). Later she indicated that *"there is not enough time to read about educational concepts"*.

In contrast, Omani-om teacher argued that training, in general, does not focus on such concepts. He mentioned that *"training of in-service teachers focuses on teaching methods and scientific topics"*. However, two informants (who were new teachers) mentioned that they might have heard this term before, but they did not remember its definition. For instance, Omania-tu teacher stated: *"This is my first year as a teacher and I'm still not familiar with a lot of educational concepts. However, I have heard about it, maybe during the preparation period for teaching but I don't have its definition"*. It seems that only new Omani science teachers engaged with the reflective practice term theoretically during their period of preparation as a teacher. However, it seems that it was not an important idea to focus on during their preparation period since they did not understand its meaning during the interview.

In conclusion, the majority of informants argued that their professional development programmes played a vital role in their lack of knowledge regarding reflective practices, and as a result, led to their lack in applying this approach.

Theme 2: Workload-Focus of Attention

Many of the informants argued that workload is one of the main influences that affect teachers' motivation. There are eight references in the interview data that consider this theme as a crucial influence concerning teachers' reflective practices. Whereas, there are eleven references that refer to this theme as an important influence regarding teachers' motivation. The resulting sub-themes for this theme are - *the number of assigned teaching lessons per week, curriculum (curriculum size and difficulties of topics), lack of teaching aids, students (class size, students' motivation, students' behaviour, students' desire to learn),* and *administrative duties.*

In terms of teaching hours per week, Omani-19 teacher asked for a reduction in his teaching hour. Furthermore, Omani-tc hoped to stop having to ask another teacher to take care of their colleague's classroom if they were absent for any reason. In terms of curriculum as a workload, a female informant from a rural area blamed the number of curricula that she teaches. She said, *"I have more than three curricula to teach"* (Omania-A$_1$).

Other informants mentioned other different aspects regarding curriculum as a workload. Some of them asked for a more organised curriculum, and others asked to clarify its real aims and purposes and to simplify its topics. For instance, Omania-tu stated that it is vital to *"Change curriculum in a way that avoids padding and increases organizing information within tables",* while Omani-tc teacher asked for *"clarity regarding the purposes of the curriculum"*. Furthermore, Omani-lm teacher blamed the difficulties of topics in the textbooks.

On other hand, Omania-f teacher mentioned teaching aids as an important factor for increasing her motivation. She said, *"I think my motivation will increase by being provided with the necessary teaching aids"*. Students, on the other hand, are one of the main factors of the workload issue for most of the informants. Some of them think that the number of students in the class is high, and some of them blame the students' bad behaviour and lack of motivation towards learning. For example, Omani-n teacher summarised how students could be a workload issue, which as a result reduces teachers' motivation towards teaching. He stated the following:

"I had high motivation when I started teaching. I can say 9 out of 10, but now after 19 years of teaching my motivation is very low, may be 5 out of 10. The main reasons are students' bad behaviour and students' academic levels being very low. They have a very low motivation to learn".

These factors of the students may also affect teachers' reflective practices. Omania-yt teacher considered class size as a factor that may reduce teachers' capability to practise reflection. However, Omani-l teacher, as well as a few other teachers, thought that the desire of students to learn, and their academic achievement, encourages teachers more to practise reflection. Omani-f teacher claimed that the *"motivation of students and their academic achievement"* plays a vital role regarding the enhancing of teachers' reflective practices.

In terms of administrative duties as a workload, the female informants seem to be more influenced by it than the male informants. For example, Omania-5 teacher said: "*reduce the administrative load and allow teachers to focus on teaching only"*. Another female teacher (Omania-A_1) said: *"I do not have motivation towards administrative aspects. There is a need for more employees to deal with such aspects".* No informants claimed that administrative duties hindered them from practising reflection.

Theme 3: Workload-Time

In fact, workload does not only affect Omani science teachers' motivation towards teaching and planning lessons, but also affects the possibility of teachers to dedicate time for practising reflection. Omani-11 teacher asked for more time to be provided for practising reflection during the school day. Furthermore, due to the workload issue, Omani-19 teacher felt that there is no time for reflection. He said:

"I think time is the main factor for reflection. How it is possible for a teacher to reflect if he can't find the time to do so. Usually, teachers do not have time to reflect, especially, if there is a pressure of having too many teaching hours per week. If you enter a classroom, you will find yourself quickly in the next classroom without having a few minutes to think about your previous actions".

There are 12 references in the interview data that support this claim. In general, most of informants argue that time for practising reflection should be taken during the school day.

Theme 4: Teachers' Personality Traits

The informants of this study argue that teachers' personality traits significantly affect their reflective practice and motivation. In terms of reflective practices, teachers' conscience, teachers' motivation, teachers' commitment, and teachers' experience are crucial personality

traits in order to form a reflective teacher, according to the perspective of the informants. Whereas, in terms of teachers' motivation, according to the teachers themselves, attributes resulting from personality traits such as their ability to form a good relationship with administration and colleagues, and feeling satisfied at work, are the main influences that form motivated teachers.

Based on the interview data, many informants claimed that teachers' conscience is one of the main influences that affect teachers' reflective practices. There are 15 references in the interview data that refer to this sub-theme as a personality trait that have a crucial influence on teachers' reflective practices. For instance, Omania-tu teacher reflected on the moral purpose of teachers, stating, *"Teachers' consciences are important because there is a great message that has to be submitted in a correct form"*. Another teacher (Omani-f) claimed that teachers will practise reflection if they possess such a conscience. She also said, *"Teachers have to avoid thinking that their goals will be achieved only if they get the salary"*.

Furthermore, teacher motivation is also a vital personality trait that has a significant effect on teachers' reflective practices, according to the informants' perspectives. This sub-theme (*teachers' motivation*) consists of - *teachers' desire to be excellent, teachers' ambition, teachers' love their work, and teachers' financial and moral reinforcement*. The sub-theme (*teachers' motivation*) underpins the previous argument which points out that some informants think that in order to increase the reflective practice of teachers, it is necessary to increase their level of motivation towards teaching. For example, an informant said, when talking about the key influences that increase teachers' reflective practices, *"It depends on the aim of a teacher from being a teacher, and does he have enough motivation and desires to be a good teacher?"* (Omani-tc teacher).

Other informants focused on the teachers' commitment as an important component of teachers' personality traits that may affect their reflective practices. Omani-lm teacher stated in this regard, *"you must have a commitment to do things correctly"*.

A few of the informants believe that teachers' years of experience play a role in practising reflection. One of them (Omania-4 teacher) claims that the current study's programme (control group1) that included reflective activities is suitable only to new teachers with no experience, while others think that practising reflection may improve in time (from

gaining more experience). For example, Omani-A$_1$ teacher said, *"Possessing more experience could force teachers to reflect".*

In terms of teachers' motivation, a few teachers mentioned their ability to form good relationships with the administration and colleagues as an effective element. They claim that if a teacher is able to form good relationships with the administration and colleagues, then their motivation towards teaching could be improved. There are seven references that refer to this influence.

Finally, feeling satisfied at work is an important factor according to a few of the informants. At least four of them claim that this attribute resulting from personality traits relates to teachers' motivation.

Conclusion

In conclusion, there seem to be common influences that may all affect teachers' reflective practices and their motivation towards teaching. These influences are professional development, workload-focus of attention, workload-time, and teachers' personality traits.

7.3 Conclusion of chapter seven

There is apparently a weak but significant correlation between teachers' reflective practices and their motivation towards planning lessons. However, the correlation is barely above the level of significant ($p= 0.050$) in the case of the relationship between teachers' reflective practices and their motivation towards teaching. Furthermore, there seem to be various common influences that may all affect teachers' reflective practices and their motivation towards teaching. These influences are professional development, workload-focus of attention, workload-time, and teachers' personality traits.

7.4 Summary of overall conclusion for the chapters of results

Omani science teachers are at a medium level of practising reflection, according to a five-point Likert scale, and they are at a level higher than medium according to a seven-point Likert scale regarding their motivation towards teaching and planning lessons. Female teachers practise reflection more than male teachers, and the difference in the mean reflective practice scores between them is statistically significant. On the other hand, there is a statistically significant difference attributed to gender among Omani science teachers' regarding their motivation towards planning lessons, in favour of Omani female science teachers. The baseline data show that generally Omani female science teachers are more

motivated towards teaching and planning lessons than Omani male science teachers. The results also show that the stratum of Omani male science teachers who teach at urban schools and have less years of experience is the worst stratum in terms of practising reflection, and in terms of the level of their motivation towards teaching and towards planning lessons.

According to the interview data and activities data, the study's intervention has a positive impact on teachers' reflective practices, and their motivation towards teaching and planning lessons. In general, using mobile applications as training platforms with a specific programme has improved teachers' reflective practices and their motivation towards teaching and planning lessons, more than the other training programmes (using workbook and using mobile apps without a specific programme). However, the standardised measures data indicate that this pattern is not statistically significant.

The findings indicate that there is a weak but significant correlation between teachers' reflective practices and their motivation towards planning lessons (N = 150, r = 0.170, p = 0.038). However, the correlation is barely above the level of significance (p= 0.050) between science teachers' reflective practices and their motivation towards teaching (N= 150, r= 0.157, p= 0.056). The analysis of interview data determined the influences that may affect teachers' reflective practices and their motivation towards working as teachers, as follows - professional development, workload-focus of attention, workload-time, and teachers' personality traits.

Chapter Eight: Discussion of Findings

Introduction

The current study is guided by three main aims. First, revealing the extent to which Omani science teachers are reflective and motivated towards teaching and planning lessons. The second aim is to explore the impact of using mobile technology on Omani science teachers' reflective practices and their motivation towards teaching and planning lessons. Finally, the study identifies the nature of any relationship between teachers' reflective practices and their motivation towards teaching and planning lessons, and the influences that affect teachers' reflective practices and their motivation towards working as teachers. In general, this chapter is devoted to discussing the study questions. It begins with presenting the study's key findings. Then, it is divided into three main sections. The first addresses Omani science teachers' reflective practice levels. It also discusses the outcomes related to the effects of the study's intervention on Omani science teachers' reflective practices. The second section discusses Omani science teachers' motivation levels, and the outcomes related to the effects of the study intervention on their motivation towards teaching and planning lessons. The final section discusses influences that affect Omani science teachers' reflective practices and their motivation.

8.1 The Study's Key Findings

Baseline data, interview data, standardised measures data, and the activities data were all employed in order to obtain the findings of this study. The findings related to the extent to which Omani science teachers are reflective and motivated towards teaching and planning lessons were determined after analysing the baseline data and the interview data. The baseline data were gathered from Omani science teachers' who teach 10th Grade (n=150) by using reflective practices and motivation instruments. The interview data were gathered from 21 participants in the intervention of the study which had an overall of 83 participants. Furthermore, the findings of the interview data, the standardised measures data, and the activities data reveal the effect of the study's intervention on Omani science teachers' reflective practices, and their motivation towards teaching and planning lessons. In addition, the influences that affect teachers' reflective practices and their motivation, were determined by analysing the interview data.

8.1.1 The extent to which Omani science teachers are reflective and motivated

Most Omani 10th Grade science teachers claim that they are reflective teachers. The baseline data and the interview data point out that they believe that they are at the medium level of practising reflection, according to a five-point Likert scale, and at a level higher than medium, according to a seven-point Likert scale regarding motivation towards teaching and planning lessons.

The meta-cognitive component (M=3.86) and the learner component (M=3.51) are the highest components in the reflective practice instrument. This finding is in line with Faghihi and Anani Sarab's (2016) study which was conducted in a neighbouring country (Iran), and used the same instrument that was used by the current study, while the Identified Regulation Motivation component is the highest component (M=6.26) in both motivation instruments. This result falls in line with Tekin (2016) where Omani pre-service teachers employed the same instrument that was used by the current study.

The current study results also show that Omani female science teachers' self-reported that reflective practice levels are higher than Omani male science teachers, and this pattern is statistically significant t (148) = -2.36, p=0.02. Furthermore, the mean scores of motivation of Omani female science teachers towards planning lessons are higher than the mean scores of motivation of Omani male science teachers. The results show that this pattern is statistically significant (U= 2180.0, Z= -2.36, p= 0.02).

Note: In order to identify the meaning of reflective practice components, see Chapter Three, section 3.1.5.1, p.97, while in order to identify the meaning of motivation components, see Chapter Three, section 3.1.5.2, p.98.

8.1.2 The effect of the study's intervention

According to the experimental group's participants (analysis of interview data), the programme that includes the use of mobile applications has generally had a positive impact on improving their reflective practice levels and motivation levels. Comparing these findings with control group1 and control group2 informants' opinions (interview data), it seems that using mobile applications as a training platform with a specific programme has more of a positive influence on developing teachers' reflective practices and their motivation towards teaching and planning lessons, than using workbooks or mobile applications without a specific programme. The analysis of the activities data supports this result. However, the

standardised measures data show that this pattern is not statistically significant, except in terms of the amotivation component in the instrument of motivation towards teaching and in terms of the intrinsic component in the instrument of motivation towards planning lessons.

8.1.3 Influences on teachers' reflective practices and their motivation

The study reveals a level barely above the level of significant association ($p= 0.050$) between science teachers' reflective practices and their motivation towards teaching (N= 150, $r= 0.157$, $p= 0.056$). However, there is a statistically significant positive and weak relationship at $p=0.05$ level between science teachers' reflective practices and their motivation towards planning lessons (N= 150, $r= 0.170$, $p= 0.038$). Furthermore, Omani 10th Grade science teachers argue that professional development, workload-focus of attention, workload-time, and teachers' personality traits are the main influences that may affect their levels of reflective practices and motivation.

8.2 Discussing Levels of Omani Science Teachers' Reflective Practices

The study relied on analysing interview data and baseline data in order to answer this question: To what extent are Omani science teachers reflective?

The majority of Omani science teachers claim that they are generally reflective teachers. According to the interview data, they are at a medium level of reflective practice. The baseline data gathered by the instrument of the reflective practice also support this result. Let us first discuss this claim. Are they really reflective teachers? What does a teacher need in order to be reflective? And before this, what does reflection mean?

In order to judge whether 10th Grade Omani science teachers are reflective or not, the researcher focused on four main points. First, what is the meaning of reflective practice from their point of view? Does this meaning fit in with the meaning of reflective practice in the literature? Secondly, what are the steps of reflection that they conduct? Third, do they employ a tool for reflective practice? Fourth, do they combine the cognitive process with an external process (actions)?

Despite the following, *"reflection is a conscious, active process of focused and structured thinking which is distinct from free-floating thoughts, as in general thinking"* (Gelter, 2003, p.338), many of informants are not aware of the term *reflective practice*. In fact, the majority of them (71 per cent) do not know a specific meaning of the term *reflective*

practices, while it seems that the rest of them consider reflective practice as a synonym of free thinking. For instance, Omani-tc teacher defined reflective practice as *"using your brain to create ideas"*. Another informant (Omani-lm) said *"thinking about lessons and how to deal with students"*. Omani-i teacher defined it as *"thinking about the teaching process"*. Thus, according to their perspective, as long as they think about a topic or an issue, then they are reflective teachers.

Reflective practice includes the investigation of an individual's attitude, assumptions and actions for the purpose of having a new approach to deal with that situation (Rogers, 2001). So, when facing a perplexing situation, reflective teachers have to collect data about the situation, and start evaluating and examining their beliefs, attitude, and assumption relating to that situation in order to be able to find a solution for it. Furthermore, reflection refers to a cognitive process that occurs in order to deal with a problematic situation (Rogers, 2001). This cognitive process has to be combined with an external process (practical actions), otherwise that reflection may not take place and teachers in that case are not ready for new experiences in the future (Boud et al., 1985).

The informants, in general, did not mention any tools for practising reflection. Relatively, most of the process takes place only in their heads. This may lead us to the assumption that the external processes (actions) are not included in their agenda. It seems that they do not examine their new strategies and approaches in new situations. In fact, it is possible to claim that 10th Grade Omani science teachers do not actually carry out many of the reflective practice procedures that are mentioned in Kolb's cycle or Gibb's cycle, simply because they did not address many of them during the interviews. I found no one saying, during the interviews, that for the purpose of dealing with a particular educational issue or a classroom situation, they evaluate their assumptions, beliefs, attitudes, and their actions and then examine the changes in a new situation. Their main focus was just on one step of the reflective practice cycle, thinking about strengths and weaknesses after implementing a lesson (the second step in Kolb's cycle and at the same time the third step in the Gibb's cycle). For example, Omania-f teacher stated: *"Yes, I practise reflection. In fact, I think about the weak points and the strong points after implementing a lesson"*. Another teacher (Omani-n) with 19 years of experience, who struggles with pupils' bad behaviour said, *"I evaluate* (evaluation: the third step in Gibb's cycle) *my actions especially in dealing with students"*. Only one teacher out of 21 informants mentioned two or three additional steps of the reflective practice cycle, Omania-yt teacher, who stated: *"I practise reflection after each*

lesson. I think about what I have done (Description: first step in both cycles of reflection)*, what are the strong points and what are the weak points* (Evaluation: the third step in Gibb's cycle)*, and how to improve my performance?* (Conclusion: the fifth step in Gibb's cycle)".

Additionally, it could be said that the Omani science teachers were unrealistic in evaluating their reflective practice levels, and were too confident in their teaching abilities. Such unrealistic confidence was revealed even through the TIMSS study which showed that Omani science teachers think that they are excellent teachers, despite the low academic level of their pupils (The Ministry of Education and The World Bank, 2012). This optimistic and unrealistic self-assessment may lead to the promotion of a culture of complacency among science teachers (The Ministry of Education and the World Bank, 2012) regarding developing their reflective practice levels. Combining all these findings may lead us to argue that the level of reflective practices of the 10th Grade Omani science teachers is lower than that which they claim. It might, in fact, be less than medium, or we could say it is at a low level. This result is not compatible with the study of Aldahmash et al. (2017), which was conducted in the neighbouring country of Saudi Arabia, and showed that science teachers practise reflection at a high level. It seems that it is in line with the study of Faghihi and Anani Sarab (2016) which indicated that teachers' overall level of reflective practice is low. As mentioned previously, the study of Faghihi and Anani Sarab (2016) was conducted in Iran and used the same instrument that was used in the current study.

The current study's results also show that Omani female science teachers practise reflection more than Omani male science teachers. This result may support some of the statistics which reveal that in general Omani female science teachers outperform males in all areas relating to school work (Alshaqsi and Ambusaidi, 2018). According to Alshaqsi and Ambusaidi (2018), Omani female science teachers strive more to apply new teaching strategies (last step in the reflective cycle) than Omani male teachers. They argue that:

> *"Female teachers owned the receptivity to change. When both female science teachers and male science teachers attend workshops in teaching methods as a training course, female teachers respond immediately and use these strategies in teaching their students. While few male teachers care about these strategies and try to implement them in their classes"*
> (p.265).

Further, one of the possible reasons for Omani female science teachers being more reflective than Omani male science teachers is that Omani female science teachers are more concerned about their learners, and how they learn, than Omani male science teachers

(Alshaqsi and Ambusaidi, 2018). Unlike Omani male science teachers, Omani female science teachers generally do not move from one point to another until feeling that students understand that point, while Omani male science teachers generally do not pay attention to this matter (Alshaqsi and Ambusaidi, 2018).

8.3 Discussing the effect of the study intervention on Omani teachers' reflective practice level

Overview

The study intervention, which lasted for 14 weeks, included three different groups. These groups were formed by 83 Omani in-service 10th Grade science teachers. 28 of them formed the experimental group and employed a training programme, hosted mainly on two mobile applications - Twitter and Facebook, designed based on two models of reflection, Kolb's cycle and Gibb's cycle, and on a motivational theory known as the Expectancy-Value theory.

Control group1, which consisted of 26 Omani in-service science teachers, were given workbooks at the start of the intervention, containing almost all of the activities that the experimental group had, except for those activities that could not be undertaken without the use of mobile technology.

Finally, the 29 Omani in-service science teachers that represented the control group2 were not offered anything to assist them, but they were encouraged to use mobile applications for educational purposes, and were asked to complete a diary card to show the extent to which they used mobile applications in their efforts in developing their profession as teachers.

Mainly, all of these programmes aimed to enhance Omani science teachers' reflective practices and their motivation towards teaching and planning lessons. This part of the section discusses the findings relating to the effect of the study intervention on teachers' reflective practices. It was expected that employment of mobile technology based on a specific programme would provide participants with flexibility in time and location, low cost, easy access to knowledge, and an increase of computer accessibility. It was also expected to increase the group cooperation which may allow each of them not only to review some of their past experiences, but also to reflect on their colleagues' practices by looking at their opinions when discussing the raised issues. Furthermore, it was expected that participants would receive feedback from their colleagues regarding their chosen strategies and actions. In

addition, there is a widespread view in Oman among those who work in the field of education, whether they are teachers, inspectors, or administrators, that Omani female teachers are generally better teachers than male teachers (Alshaqsi and Ambusaidi, 2018). Due to religious and social restrictions, it is slightly difficult for both sexes (male teachers and female teachers) to interact together during any training programme, even if this programme takes place in a room at the training centre. Therefore, one of the expected benefits of this programme was to bring both sexes together, not only to provide an acceptable interactive environment that could overcome social, religious, and cultural constraints, but in order to take advantage of the alleged differences between them in the effort of developing their reflective practices (Alshaqsi and Ambusaidi, 2018).

In contrast, the employment of the programme that used workbooks as a platform also seemed to somehow be useful, because it may allow participants to practise self-reviewing on some of their past experiences, and it may help them to rethink their own practices. However, it cannot support any interaction with colleagues, and it is incapable of overcoming the religious and social restrictions between sexes (male teachers and female teachers). Furthermore, printing workbooks is costly, and the participants have limited access to knowledge. Finally, it was expected that the employment of mobile applications, without relying on a specific programme, may provide them with the freedom to utilise mobile applications in a way that they prefer, and the participants would then be able to be flexible with time and location, low cost, easy access to knowledge, and an increase in computer accessibility. However, it does not support any interaction with colleagues, and was unprepared for overcoming religious and social restrictions between sexes (male teachers and female teachers). Teachers were only encouraged to use mobile applications freely in their effort to develop their profession as teachers. They were asked to document their efforts in this regard on a diary card.

Overall, the standardised measures of data revealed that the growth, over time, in science teachers' reflective practices did not differ significantly in any group. This is also the case with all of the components of the reflective practices instrument. However, the interview findings demonstrate that the programme of using mobile applications as a training platform (the experimental group) has a positive impact on teachers' reflective practices, more so than the other two other programmes (control group1 and control group2). At least seven informants claimed that the programme increased their reflective practices level. Many of them also demonstrated positive views towards using mobile applications as a training

platform, such as - giving more time to reflect and search, reducing effort in planning lessons, improving ways to plan lessons, evaluating teaching skills, improving teaching methods, thinking more about students' needs, comparing levels of teaching and planning to colleagues, providing new ideas about how to deal with some classroom situations, understanding some teaching skills more clearly than previously, and they felt that this was a useful experiment.

8.3.1 How could the programmes succeed to improve teachers' reflective practices?

In order for the three training programmes to succeed regarding developing teachers' reflective practices they have to be capable of:

1- *Questioning the assumptions and beliefs (the trigger for reflection).*

Reflection begins when an issue or a problem occurs (Akhbari et al., 2010). In fact, it *"is triggered by an unusual or perplexing situation or experience, involves examining one's responses, beliefs, and premises in light of the situation at hand"* (Rogers, 2001, p.41). Questioning our beliefs, as well as our uncertainty about them, is so important for reflective practice to actually take place. Minott (2011) asserts:

> *"The act of examining one's beliefs about teaching and testing these beliefs in the rigour of classroom realities should result, not only in the development of new knowledge, but could also reinforce beliefs held about teaching. In other words, reflecting on one's beliefs results in the development of new practical knowledge. In addition, reflecting on practical knowledge could result in the development of new beliefs"* (p.134).

Dewey (1910) argues that the reflective process involves *"a state of perplexity, hesitation, doubt"* (p.9). So, in order for any of these programmes to succeed in developing teachers' reflective practices, they should have the capability to help Omani science teachers question themselves regarding the discussed teaching skills.

2- *Combining the cognitive process with the practical process.*

Dewey (1910) also argues that the reflective process involves *"an act of search or investigation directed towards bringing to light further facts which serve to corroborate or to nullify the suggested belief"* (p.9). Boud et al. (1985) asserted that reflection is action-oriented and focuses on the interaction between internal (cognitive processes) and external processes (actions) in order to be ready for new experiences in the future (Boud et al., 1985). In fact, *"reflection is thinking about thinking in which we consider the relationship between our thoughts and actions in a particular context"* (Boud et al., 1985, p.141). It seems that

without the interaction between cognitive processes and external processes (actions), reflection does not take place (Boud et al., 1985), and the programme will not achieve certain goals.

3- Interaction with colleagues.

According to Rodgers (2002), reflection occurs in an environment of dialogue and interaction with others. This means that any programme concerned with enhancing reflective practice has to provide an environment of interaction with colleagues in order to succeed in its aim.

8.3.2 Preparing the programme

First, let us ask if the programmes of the experimental group, control group1 and control group2 were properly prepared, and whether they had the required factors to succeed in their goal in terms of improving teachers' reflective practices. Both the experimental group and control group1 programmes began by questioning teachers about how capable they were to perform a certain teaching skill. This step is part of the Expectancy-Value theory and represents the expectancy beliefs of teachers' abilities to implement a certain teaching skill, but at the same time, this could be considered as the required trigger for raising questions regarding a teaching skill. Furthermore, the programmes of experimental group and control group1 were hosted either by mobile applications or workbooks, and the activities were designed according to the two reflective cycles. If the participants of both groups conduct these reflective cycle steps, then they may attain the required interaction between the cognitive process and the practical process. Examining new strategies is an essential step of these cycles.

In terms of the experimental group, using Facebook and Twitter allowed them to have an environment of direct and indirect interactions with colleagues. In terms of control group1, although using workbooks as a training platform did not provide the required dialogue environment, it did provide them with an opportunity to apply a reflective model for the purpose of self-reflection. However, control group2 lacks the capability of questioning teachers about a teaching skill, providing the required interaction between colleagues, and combining the cognitive process with the practical process.

It seems that the experimental group programme has everything it requires for enhancing their reflective practices, such as questioning their beliefs and assumptions, interaction with their colleagues, and the encouragement to integrate the cognitive process

with the practical process. It could be considered that the programme of the experimental group succeeded in many respects. Many of its participants carried out its activities. Furthermore, unlike the participants of both control groups, most of the experimental group's participants praised its benefits, especially regarding improving their reflective practice levels.

However, why does the standardised measures data indicate that although there is more improvement in the experimental group's reflective practices than the two control groups, it is not statistically significant? The following factors may answer this question.

Sample size

The insignificant results of the standardised measures data may be explained by the fact that the sample size of the study intervention is smaller than it should ideally be. The conducted estimation of the sample size revealed that there needs to be at least 189 participants, not 83. Otherwise *"there is a risk that the power is not sufficient to detect an effect if one truly exists"* (Farrokhyar et al., 2012, p.208). In other words, the probability of getting statistically significant data (if it exists) is not as it should be. There may have been a real effect, but the effect is small and the study did not have the power to detect this. This was a risk that I could not avoid since the required sample size (189) was higher than the population size (156). The researcher believes that if the sample size was high enough, the standardised measures data could indicate a different result.

However, the results of the standardised measures data might be true, and the sample size issue is not the reason. In this case, this could be attributed to the following factors:
1- Methods of preparing and training teachers do not encourage them to be reflective.
2- The resistance to change of senior teachers, inspectors, and principals.
3- Interaction between participants not working as intended.
4- Some participants might struggle to maintain the required commitment to the training programme.

Methods of preparing and training teachers do not encourage them to be reflective

It is very likely that the thought of questioning their beliefs and assumptions did not occur with some participants. This is because of the nature of the preparation and training that they would have received in the past, as well as the nature of the instructions they received from their head teachers, inspectors, and school principals. As an inspector for more than 14

years, the researcher thinks that teachers are generally trained to obey instructions from educational officials. They also learn that for each educational dilemma there is a certain method of solution. For example, for the purpose of taking into consideration the individual differences among pupils, they just need to diversify their teaching methods and their teaching aids, and employ cooperative learning. Thus, teachers have ready solutions sourced from officials (headteachers, inspectors, and school principals). As long as they follow their advice and instructions, then there is not any need for doubts and questions about any educational dilemma that could potentially take place. It seems that this feeling of possessing the correct answers prevents the occurrence of perplexity and doubts among the participants, which are actually necessary feelings, as they trigger reflection (Rogers, 2001).

Furthermore, the analysis of Question 2 (To what extent (1-10) do you feel satisfied …..) regarding activities that were designed based on Gibb's cycle and were carried out by the participants in the experimental group and control group1 indicated that there is a high level of satisfaction with them regarding the extent to which (out of 10) they implement their teaching skills as required (see p.150). The mean performance of the experimental group is (M=7.80), while the mean performance of the control group1 is (M=8.07). This is despite the claim that *"the Omani society continues to show dissatisfaction with the quality of teachers in general, and their effectiveness in the classroom in particular"* (Al-Ani, Al Barwani, and Al-Balushi, 2012, p.89). This reinforces the findings that show that Omani science teachers believe they are excellent teachers (the Ministry of Education and the World Bank, 2012), and according to them, the need to question themselves regarding their teaching skills seems to be unimportant. The following graph shows the extent (out of 10) to which teachers are satisfied regarding their levels of different teaching skills (Facebook vs. Workbooks):
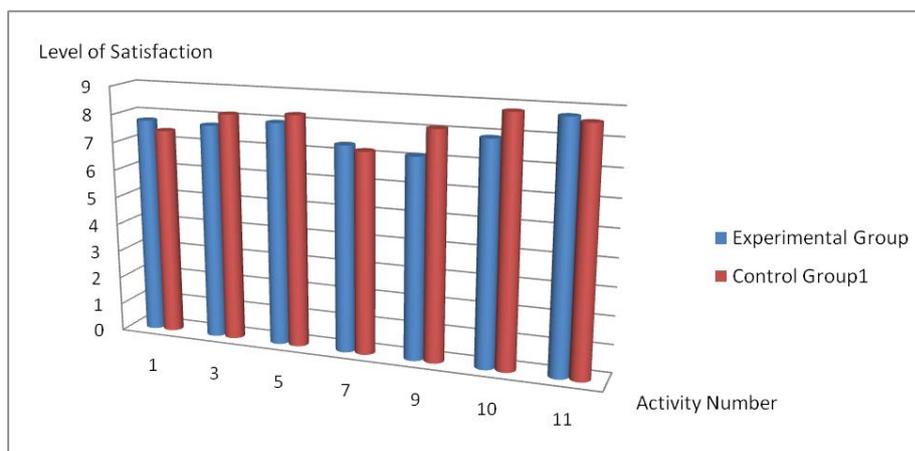
Figure 8.1: Experimental group and control group levels of satisfaction regarding

teaching skills

The resistance to change of senior teachers, inspectors, and principals

Al Jabri et al. (2018) stated that *"Teachers' preparation in Oman is excessively theoretical in content, and during their studies, teaching students are not given adequate practical tools to cope with everyday life in the classroom"* (p.86). Omani headteachers, inspectors, and principals were prepared according to this traditional approach that focuses on receiving theoretical knowledge, and not on generating it (Al Jabri et al., 2018; Al-Issa, 2008), whereby the teaching practice period is so limited (Al Shabibi and Silvennoinen, 2018). This leads to receiving teaching training that has no links to teaching in real situations (Al Shabibi, 2013).

Thus, how it is possible to ask teachers to think beyond the fixed framework, shaped by officials, without any coordination with those officials? Furthermore, how could we ask those officials to provide the required reflective practices environment for teachers without preparing them to do so? In fact, after finishing implementing any professional development programmes, teachers might need an assistance from their head teachers or inspectors during any in-class application in order to be able to master any of their new skills or approaches that were obtained as a result of being participants in that programme (Joyce and Showers, 1980). Therefore, it seems that the changes have to start from the top, rather than from the bottom. In fact, in order to have reflective teachers, we may first need head teachers, inspectors, and school principals who are reflective and have the ability to train teachers in how to be reflective. A special training programme aimed at preparing reflective head teachers, reflective inspectors, and reflective principals, should be arranged before preparing the programme aims for obtaining reflective teachers.

Interaction between participants not working as intended

Another crucial factor, that may explain the insignificant result, is required interaction between participants. Knowing the views of one's colleagues on a common theme or on a certain question is a type of desired interaction between teachers. Furthermore, the diversity of the provided answers offers a wide area for reflection. In fact, the mobile-technology programme was prepared in order to achieve this part successfully. Participants were able to see the responses of their colleagues regarding the activities' questions. However, most of the participants did not comment on their colleagues' responses, despite having the facility to do so. Does the presence of both sexes diminish this desired interaction? Although there is no

clear evidence that could support this claim, according to my experience as an inspector perhaps this is true. It is possible to argue that the two sexes should possibly be separated from one another. It seems possible that bringing them together did not lead to the desired interaction. The cultural-religious constraints that could work against the interactions and dialogues between the two sexes may have been strong enough to reduce the interaction between female teachers and male teachers.

Furthermore, in this study, the identity of participants in the experimental group was protected and not exposed. Perhaps the reason behind the weakness in the interaction was not due to the presence of both sexes, but due to the participants' identities being hidden. The interaction between participants may require distinguishing the identity of the people that they interact with. For example, a female participant from the experimental group was slightly late in starting the activities. After two weeks she sent me a message by WhatsApp saying, *"I'm very sorry to be late. As far as I can see, many of my colleagues have already started. Oh, I hate social media".* I told her that was fine, and that she could start that week. After a period of time, I found her in the training centre, and asked her why she hated social media. She replied, *"I hate interacting with people when I do not know their identities".* It seems that hidden identification shapes a barrier which blocks interaction and communication between individuals. In fact, there is a need for further studies to explore the effect of gender, and the protection of identity, on interactions between trainees in an online virtual programme.

Some participants might struggle with maintaining the required commitment to the training programme

The results can be also explained by participants perhaps not maintaining the required commitment to the training programme. This view is reinforced by the Ministry of Education's statement which confirmed that there is some concern that many teachers do not maintain the required commitment to the training programmes that they receive (the Ministry of Education and the World Bank, 2012). In order to verify this commitment, it is not enough for participants to answer the activities questions. They must examine the validity of their new ideas and strategies in new classroom situations. In other words, they must achieve the interaction between the cognitive process and the practical process. A few participants from the experimental group indicated that they tested their new solutions and ideas in subsequent classroom situations. For instance, Omania-yt teacher said: *"I have two 10th Grade classes and I'm always doing much better during implementing the second lesson because I reflect*

on the first one". In fact, I think many teachers in the experimental group have still not examined their new strategies or solutions in new classroom situations. In addition, based on interview data, it seems that most of the study's participants (all groups) did not examine their newly adopted strategies and methods in new teaching situations.

Further, according to Joyce and Showers (1980), teachers might need an assistance during examining their new strategies or solutions. Joyce and Showers (1980) argue that training helps to fine tune existing skills or approaches, and master new approaches. Tuning existing approaches aims to reinforce their effectiveness. Thus, it is easier than mastering any new approach because the level of required changes is not high (Joyce and Showers, 1980). The approach of using mobile apps for training or for enhancing reflective teaching might be considered as a new approach for Omani science teachers. Therefore, intensive training and considerable effort is required. According to Joyce and Showers (1980), training may contain several elements such as, *"a presentation of theory or description of a skill, modelling or demonstration of skills, practice under a simulated or classroom condition"* (p.380). Furthermore, it may contain elements such as the provision of feedback and providing assistance during the in-class application (Joyce and Showers, 1980). Each of these training elements has a different effect on the trainees, such as providing awareness, possessing new knowledge, *"learning new principals and skills, and implementing these principals and skills in new situations and conditions"* (Joyce and Showers, 1980, p.380).

The ability to implement new skills in new situations may require a combination of all of the previous training elements, especially providing assistance during the in-class application. It was clear from the beginning that the intention of the current study was to help teachers acquire new knowledge, understanding, and motivation (promoting reflective teaching), but the researcher did not have the ability to provide assistance during the in-class application for all of the participants. Also, he was not able to provide the required inspectors in order to help him to do so. However, the researcher argues that the study intervention, especially the programme of the experimental group, was helpful in increasing teachers' awareness, knowledge, and skills related to their reflective practice, though it may not have been sufficient to lead, by itself, to a sustained change in practice.

8.4 Conclusion (Teachers' Reflective Practices)

The analysis of the baseline data and the interview data indicates that Omani science teachers are at a medium level of practising reflection, according to a five-point Likert scale.

However, some evidence shows that their reflective practice level might be lower than medium. The current study's results show that Omani female science teachers practise reflection significantly more than Omani male science teachers. Furthermore, despite the experimental group programme being useful for improving reflective practice levels, according to many informants the programme might be capable of providing some elements which are vital for reflection to take place such as questioning the assumptions and beliefs (the trigger for reflection) of participants, combining the cognitive process with the practical process, and providing required interaction between colleagues. The standardised measures data show that the differences between the study groups in their reflective practice levels were not statistically significant (for more details, see Appendix N, p.324). The researcher considers that this result is likely to be due to a combination of the following factors:

1- The sample size of the study intervention is smaller than it would ideally be.
2- The various methods of preparing and training teachers do not encourage them to be reflective.
3- The resistance to change of senior teachers, inspectors, and principals.
4- The interaction between participants did not work as intended.
5- Some participants might struggle to maintain the needed commitment to the training programme.

In fact, further research might be required in order to examine these factors.

8.5 Discussing Levels of Omani Science Teachers' Motivation

Introduction

This section covers the discussion about teachers' motivation levels towards teaching and planning lessons. It also discusses the effect of the study intervention on teachers' motivation towards both teaching and planning lessons. The majority of Omani science teachers claim that they are generally motivated in teaching and planning lessons. According to the analysis of the interview data, they are at a level higher than medium. The baseline data gathered by both instruments of motivation (towards teaching and towards planning lessons) also supports this result. In the following part of this section we discuss this claim. Are they really motivated? How to decide whether teachers are truly motivated or not? What are the characteristics of motivated teachers?

The study's findings (baseline data) reveal that levels of Omani 10th Grade science teachers' motivation towards teaching are higher than medium (M= 4.83) according to a seven-point Likert scale. The majority of informants feel that they are motivated towards working as teachers.

The baseline data show that the Identified Regulation Motivation component is the highest component in the instrument of motivation towards teaching (M=6.26) which means that they are more willing to engage in teaching activities only if they believe that implementing these activities is important for them. There is a big difference, as the table (6.2) shows, between the mean of the Identified Regulation Motivation component (M=6.26) and both External Regulation component (M=4.31) and Amotivation component (M=2.18). This shows that Omani science teachers do not intensively seek reward, and they are slightly motivated towards teaching by external demands. This also shows that they are not suffering from an absence or a significant decline in motivation towards school work (Pintrich and Schunk, 2002).

In contrast, the differences between the mean of the Identified Regulation Motivation component (M=6.26) and the other types of components, such as the Intrinsic Motivation component (M=5.74) and Introjected Regulation Motivation component (M=5.65) are about (0.5) and (0.6) respectively which does not seem too high. This means that engaging in teaching itself is a source of satisfaction for Omani science teachers. This also shows that *"they teach to avoid guilt or anxiety or to attain ego enhancement, such as pride"* (Ryan and Deci, 2000, p.72). This result falls in line with Tekin (2016), where Omani pre-service teachers employed the same instrument that was used by the current study. Tekin (2016) points out that Identified Regulation Motivation is the highest component of extrinsic motivation. Note: In order to identify the meaning of motivation components, see Chapter Three, section 3.1.5.2, p.98.

In terms of motivation towards planning lessons, it seems that the study's findings are basically similar to the findings related to the levels' of teachers' motivation towards teaching. The study's findings (the baseline data) also reveal that levels of Omani 10th Grade science teachers' motivation towards planning lessons is higher than medium (M=4.72) according to a seven-point Likert scale. The findings also show that the Identified Regulation Motivation component is the highest component with Omani science teachers (M=5.99) which means that they plan lessons because they believe that this task is important. The

differences between the means of the Identified Regulation Motivation component (M= 5.99) and the other two components of the instrument, Introjected Regulation Motivation component (M=5.45) and Intrinsic Motivation component (M= 5.22), are not too high. This shows that teachers plan lessons in order to avoid feelings of guilt or anxiety. Furthermore, it means that they relatively enjoy planning lessons.

However, there is a big difference between the means of the Identified Regulation Motivation component (M= 5.99) and both External Regulation components (M=4.50) and the Amotivation component (M=2.44) which is similar to the case of motivation towards teaching. Based on the meaning of motivation components in Pintrich and Schunk (2002), this means that Omani science teachers do not expect any type of reward as a result of their effort in planning lessons. This also shows that they are not suffering from an absence or a significant decline in motivation towards planning lessons.

Many researchers describe teachers' motivation as a complex matter that has strong connections with teachers' feelings, experiments, relations, personalities, and their actions context (Hiver et al., 2018). Thus, it is not easy to judge whether a teacher has the advantage of motivation or not. However, some studies suggest that if teachers are characterised by certain characteristics, then we can assume that they are motivated. For instance, Karabenick and Conley (2011) argue that in order to describe teachers as motivated, they have to teach pupils due to intrinsic and social factors, but not due to extrinsic factors. The mean values of the intrinsic motivation components in both instruments of motivation are generally high, ranging between (M= 5.22) and (M=5.74).

However, the current study's findings also show that teachers, as a whole group, have a higher extrinsic motivation in both instruments of motivation, than in intrinsic motivation. The identified motivation component, which is a type of an extrinsic motivation, is the highest component in both instruments of motivation. This suggests that the external motivational factors have strong influences on 10th Grade Omani science teachers' motivation beyond the influences of intrinsic factors.

There are many examples which show that informants think that their motivation is derived from intrinsic reasons. For example, Omani-19 teacher said: "*I also have an internal motivation that drives me to work in a good way*". While Omania-yt teacher stated: "*I am very interested in teaching. I have a desire to give whatever I have to help students to learn*". Omani-lm teacher stated: "*I have motivation towards my profession because I like to be a*

teacher". Omania-A$_2$ teacher claimed that she is not interested in external factors. She is motivated because she loves teaching and her relationship with the pupils. Furthermore, a few informants considered the desire to be an excellent or a creative teacher as the source of their motivation. In contrast, Omani-20 teacher and the majority of the participants show clear external motivational aspects. For example, Omani-20 teacher said: *"I have a high motivation level (9 out of 10). Getting a promotion in my profession is one of my main goals".* In fact, many of the informants argue that teachers' motivation is mainly due to external influences. According to them, influences such as teaching workload, administrative duties, curricula, students, lack in teaching aids, and relationship with administration and colleagues, can increase or decrease teachers' motivation. There are different views on how to identify motivated teachers. For instance, Renandya (2015) argues that individuals who are motivated are more *"enthusiastic, goal-oriented, committed, persistent and confident in their learning"* (p.177). Additionally, *"they are willing to work hard to achieve their goal and do not easily give up until they achieve that goal"* (Renandya, 2015, p.177). Besides, Hiver et al. (2018) claim that teachers who are motivated have the following personality characteristics:

- *Enthusiasm:* they have a high enthusiasm and are keen to teach their pupils, even with the existence of challenges.

- *Resourcefulness:* providing anything required for dealing with the classroom situations, and for dealing with learners' needs.

- *Creativity*: the ability to change the usual methods of teaching, techniques, and educational aids. In other words, they attempt to employ innovative methods in order to stimulate learners' interest.

- *Strictness:* establishing clear rules for classroom systems and ensuring that learners are associated with lessons through the employment of tests, homework, and a reward system.

A few of these characteristics (enthusiasm, resourcefulness, creativity, strictness, goal-oriented, commitment, persistence and confidence, working hard, not giving up easily) can be seen with some of the study participants.

Enthusiasm

In terms of enthusiasm, Dornyei (1998) and Bicaku-Cekrezi (2015) claim that teachers' enthusiasm levels are a vital element that could contribute to an improvement in pupils' motivation. It is natural for teachers to be enthusiastic to teach a particular topic,

which in turn can increase the pupils' enthusiasm and motivation, leading to a high level of understanding in that subject (Bicaku-Cekrezi, 2015). Only Omania-yt teacher showed signs of enthusiasm when she said, *"I am very interested in teaching and I have a desire to give whatever I have to help students to learn"*. In contrast, the reverse is noticed when listening to some of the other informants, such as Omani-n teacher who said:

> *"I had a high motivation when I started teaching (9 out of 10), but now after 19 years of teaching my motivation is very low (5 out 10). The main reason for that is students' bad behaviour and students' academic levels, which are very low. I feel tired due to the age factor and the school environment is so unpredictable".*

Furthermore, Omani-i teacher showed the same stance of Omani-n teacher when he stated: *"I used to have a high motivation when I started teaching, but now I don't think that I have a high motivation"*.

Commitment

Dornyei (1998) also claims that teachers' commitment levels towards teaching are a crucial influence that may contribute to improving pupils' motivation. Only Omani-om teacher showed positive signs of commitment towards teaching when he said, *"My motivation is high (10 out10). I have never been absent and I have never asked for a holiday"*. In fact, this is an expected result since AlShabibi and Silvennoinen (2018) claim that Omani teachers' *"commitment level is still not satisfactory as many teachers, even female teachers, view teaching as a source of income and to be carried out with the minimum amount of effort"* (p.269). Further, Al Jabri et al. (2018) also claim that Omani new teachers' commitment is not high.

Confidence and other Characteristics

In terms of other characteristics, such as resourcefulness, creativity, and persistence, I could not find a clear sign relating to all of these characteristics. During my conversation with many of the informants, I discovered that many of them had confidence in the ability to achieve the goals of learning, but I did not find much evidence of enthusiasm and desire to practise teaching or planning lessons.

In general, it can be said that there is little evidence that reveals the availability of a good level of motivation with Omani science teachers, and the intrinsic influence has a significant impact on their motivation. However, this motivation does not seem to be higher than

medium, as Omani science teachers' claim. This is because the key traits (enthusiasm, commitment, and others) of informants which can be used in order to determine whether teachers are motivated or not seem to be not high. Furthermore, Omani science teachers' motivation towards teaching and planning lessons is mainly due to external factors. This finding is in contrast with Hein et al. (2012), who conducted research in five European countries and revealed that teachers' motivation is more intrinsic than external.

On the other hand, the Mann-Whitney' U test indicated that there is a statistically significant difference in the mean score of motivation towards planning lessons between Omani female science teachers and Omani male science teachers. Omani female science teachers claim that they are more motivated towards planning lesson than Omani male science teachers. This is may be because Omani female science teachers could be similar to Omani female students in terms of taking advantage of post-school time, more so than males (the Ministry of Education and the World Bank, 2012).

In fact, according to my knowledge, some Omani male teachers tend to run private businesses during their time outside of the school day, in order to increase their financial outcome, since males are socially responsible for the financial security of their family, rather than females. Syed (2008) states that according to Islamic law: *"The man has the responsibility to provide social and economic security"* (p.248) for the family. Various other Omani male teachers may spend their time practising their hobbies while some female teachers may spend time at home, especially if they do not hold driving licences. Even with driving licences, women, according to some Islamic scholars' points of view, are not allowed to leave their homes without obtaining permission from their guardian, either their husband or father (El-Shobaky, 2006). This may reduce their length of time being outside of the home. For that reason, planning lessons after school could be a difficult task for many Omani male science teachers, since they may have exerted much effort in their private businesses and hobbies, but this might not be the case in terms of females. This finding is not in line with Boset et al. (2017), who conclude that there is no effect of gender on English teachers' motivation towards work. Boset et al. (2017) study was conducted in the neighbouring country of Yemen. It used The Multidimensional Work Motivation Scale (MWMS) that was developed by Gagne et al. (2015) in order to measure teachers' motivation.

8.6 Discussing the effect of the study intervention on Omani teachers' motivation levels

Overview

One of the main goals of the current study intervention is to enhance Omani science teachers' motivation towards teaching and planning lessons. This part of the section first presents the expected affordances of the three programmes regarding improving teachers' motivation. It then discusses the findings related to the effect of the study's intervention on teachers' motivation towards teaching and planning lessons. There were different expectations regarding the affordances that the three programmes may provide regarding improving teachers' motivation.

The programmes of the experimental group and control group1 included 12 activities that were prepared (partly) based on the Expectancy-Value theory, while control group2 employed mobile applications without a specific programme. As mentioned previously, the employment of mobile technology according to a specific programme that was hosted mainly on two mobile applications (Twitter and Facebook) could provide participants with flexibility in time and location, low cost, easy access to knowledge, and an increase in computer accessibility. Adding to these features, it could provide the participants of the experimental group the possibility to interact with their colleagues, which may stimulate them to carry out the activities. As a consequence, it may lead to improving their motivation.

Meanwhile, there was a slight expectation of an increase in control group1 teachers' motivation towards teaching and planning lessons through employing workbooks. In this training programme, participants were not able to easily access knowledge. In addition, they were not able to employ group dialogue or cooperative learning.

Finally, despite the many features of using mobile applications without relying on a specific programme, such as the flexibility in time and location, low cost, and easy access to knowledge, control group2 was not expected to increase its motivation towards teaching and planning lessons since there is no interaction between colleagues and they do not follow a specific programme.

Despite that the fact that some of the reflective tools are effective in developing motivation (Amirkhanova, Ageeva, and Fakhretdinov, 2016), the Friedman tests show that the type of training platform which employs reflective approaches does not have a significant effect on science teachers' motivation towards teaching or towards planning lessons. However, the results of these tests show that the p-value in the case of teachers' motivation towards teaching variables is significant only in regard to the Amotivation component (p=0.017) but, it is not significant in any of the other components. The results also show that

the *p*-value is significant only in the case of the Intrinsic component (*p*=0.028) of the instrument that assesses teachers' motivation towards planning lessons. Thus, using mobile applications as a training platform has a positive impact on the Amotivation component in regard to teachers' motivation towards teaching. This means that the engagement of Omani science teachers in a reflective approach programme using mobile technology reduces significantly the decline in their motivation towards teaching. This falls in line with Sobral (2004) who claims that there is a negative relationship between amotivation and reflection. Furthermore, using mobile applications as a training platform has a positive impact on the intrinsic component in regard to motivation towards planning lessons. This means that the engagement of Omani science teachers in a reflective approach programme using mobile technology increases significantly teachers' interests and enjoyment in planning lessons task.

The interview findings demonstrate that the programme of using mobile technology as a training platform (experimental group) has a positive impact on teachers' motivation towards teaching and planning lessons, more so than the other two other programmes (control group1 and control group2). Many informants in the experimental group showed a positive view about their training platform regarding its capability to contribute to enhancing their motivation towards teaching and planning lessons, whereas both control group1 and control group2 showed a negative view. In fact, at least nine informants of the experimental group claimed that the programme increased their motivation levels. Many of them described it as a useful experience and useful method to reduce their efforts in planning lessons. Furthermore, the analysis of the activities data showed that the workload (the cost to implement the activities) in the experimental group is less than the workload (the cost to implement the activities) in control group1.

8.6.1 How could the experimental group programme succeed to improve teachers' motivation?

It is quite natural to ask how such a mobile-based programme can enhance in-service teachers' motivation. What is the basis for this programme to achieve this purpose?

The researcher argues that in order for the experimental group programme to achieve its goal regarding fostering teachers' motivation, it should provide an interactive and dialogic environment, allow teachers to increase their reflective practices and confidence, be capable of increasing teachers' enthusiasm, and be helpful to reduce teachers' workloads.

Interaction between participants did not work as intended

The idea of this programme was based on creating an interactive and dialogic environment for teachers in order to discuss problems associated with teaching and planning. *"The motivation to do things is influenced by agency (inherited personality) and structure (environment)"* (Heystek and Terhoven, 2014, p.631). This interactive and dialogic environment could allow teachers to obtain feedback from their colleagues that could lead to promoting their motivation towards teaching and planning. According to Abass (2008), interactions between learners increase their motivation to learn. Thus, interactions between teachers (learners), as they strive to reflect on their teaching and planning skills, may increase their motivation to improve their teaching and planning skills. Heystek and Terhoven (2014) argue that teachers' interaction is clearly a vital element for improving their motivation. *"Interaction with colleagues can provide a sense of community to help overcome a sense of isolation and build a feeling that we are all in this together"* (Firestone and Pennell, 1993, p.505).

There were various types of direct and indirect interaction between participants in the experimental group programme. They generally received feedback from various colleagues, which was clearly revealed in their interview responses. For example, Omania-yt teacher, a new teacher who was excited to learn her colleagues' opinions on some of their teaching skill levels, stated:

> *"I was very interested when I saw some colleagues saying that their level in some teaching skills reached 9 or 10. I asked myself why I can't be like them. However, sometimes I feel satisfied when I see my level in a skill equals the level of most of my colleagues. This gives me a sign that I am moving in the right direction".*

Yet, there was another way of indirect interaction that was not desired. Occasionally, various teachers copied their colleagues' responses and adopted them as their own responses. Furthermore, although there was a button to comment on participants' responses on Facebook and Twitter, the majority of them did not activate it. In fact, the interaction between teachers, in general, existed but not as intended. The reason behind this is explained in the previous section regarding reflective practices.

Practising reflection and teachers' confidence

The activities of this programme were also designed according to reflective practice cycles. The current study hypothesised that practising reflection may lead to a discovery of solutions for many obstacles that hinder teachers' efforts regarding the teaching and planning areas which may contribute to strengthening their motivation towards that area. In other

words, there seems to be a direct relationship between reflective practice and motivation (Wang and Ribera, 2016).

Furthermore, according to Sulisworo and Suryani (2014), there is a direct relationship between learners' confidence and motivation. Teachers' confidence about their teaching and planning skills could be gained through the feedback provided by the programme. Feedback *"makes teachers more confident and comfortable with their own practices"* (Orjuela and Delgadillo, 2014, p.87). When teachers (who learn through this programme) find out why they are not able to implement a specific teaching skill as required, they will have greater confidence in carrying out this skill in the future (Sulisworo and Suryani, 2014). The greater their confidence, the greater their motivation (Sulisworo and Suryani, 2014). The programme seeks to provide teachers with more confidence regarding their teaching and planning skills through employing reflective practice techniques. This confidence may contribute to making teachers more motivated to carry out these skills in the future.

Many teachers in the experimental group claim that the programme contributes to making them more confident with their teaching skills. For example, Omani-lm teacher said, *"a positive development has been noticed and the impact of that can be seen in my teaching practices".* He claimed that he became more confident with his teaching after participating in this programme. Another teacher (Omani-tc teacher) seems to be more accomplished with a variety of teaching skills, such as the differentiation skill. He stated: *"Participating in the programme (experimental group programme) gave me new ideas about how to deal with some classroom situations, such as dealing with differentiation between students".* Finally, Omania-j teacher showed the strong relationship between feeling confident and motivation by saying, *"This programme increased my motivation by increasing my self-confidence and my abilities".* According to these responses, it can be noted that the programme of the experimental group was generally useful for increasing the participants' reported confidence in their teaching abilities. However, it did not appear to me that the programmes of the other two groups had a similar impact (enhancing teachers' confidence). On the contrary, some of them pointed out that this programme suited other types of teachers. For instance, Omania-5, from control group1 stated: *"I think this programme might be useful for new teachers".*

Increasing teachers' enthusiasm

Although the use of Facebook and Twitter is common in many countries of the world, its use is not as widespread in other countries, especially amongst women. In the culture of

some countries, such as Oman, women are not so in favour of using such channels of communication. I have found a quite number of female teacher participants who did not have the knowledge of how to subscribe to Twitter or Facebook, and they did not have private accounts in these applications. I have spent much time with some of them trying to teach them how to employ these applications. However, learning something new was a source of enthusiasm for several of them. For example, Omani-f teacher stated, when asked about the effect of mobile technology programmes on her motivation:

> *"It was fascinating and interesting to participate in this programme since I didn't have prior knowledge of how to use Facebook or Twitter. I think this might be one of the main factors that pushed me to say that my motivation towards teaching or my reflection became much better than before. Yes, the activities were useful but I believe being part of the Facebook society or Twitter society was the source of that effectiveness".*

Another female teacher claimed that *"The activities are enjoyable. They draw attention to very important practices that can be neglected due to the noisiness of work"* (Omania-t teacher). In contrast, this was not the case with Omani-tc, who teaches at a rural school and has private accounts on both Twitter and Facebook. He said: *"I felt sometimes that the programme might be another type of burden"*. It was also not the case with Omania-l teacher who teaches at a rural school. She stated, *"I have many curricula to teach and that led me to feel sometimes that the programme is just another burden"*. They both teach at rural schools and both argue that the programme was just another source of a burden of work.

In general, it seems that Omani female science teachers do not just strive more to apply new teaching strategies than Omani male science teachers (Alshaqsi and Ambusaidi, 2018), but they are also more open to utilising new training platforms, than Omani male science teachers. Furthermore, it seems that teachers who teach at rural schools are not in favour of employing mobile technology in their professional development programmes. This may be due to workload (planning multiple curricula), or due to the weakness in 3G internet coverage. However, the available interview data are not sufficient to compare participants' enthusiasm, based on their gender or according to the school location.

In terms of control group1 and control group2, I can confirm that no informant showed this type of feeling (enthusiasm) toward their programme. On the contrary, I found some of them believed that their programmes were not enjoyable, and the activities were repeated. For example, Omani-19 from control group1 said, *"Despite the change of the activities' topic, the structure of all activities is the same which may lead to feeling bored".*

Another teacher (Omani-20) from the same group asked for a reduction in the number of activities. He said, "*I think twelve activities were too much, six activities would be much better*".

In conclusion, it seems that the programme was more enjoyable and interesting for Omani female science teachers in the experimental group who teach at urban schools than the rest of strata. This is could be because they do not teach too many curricula, they have good internet coverage, and they may have more free time at home than the males.

Reducing teachers' workload

The majority of control group1 considered their programme to be another type of workloads, while only two informants (who teach at rural schools) in the experimental group claiming that the programme increased their workloads. Perhaps this is because of the abilities of control group1 (their training platform was workbooks) to clearly see the quantity of knowledge that their programme deals with, while the quantity of knowledge that the experimental group were dealing with in their programme was not clear (their training platform was mobile apps). Each week the experimental group were able to see one link for one activity. Although both experimental and control group1 programmes contained some ready-made lessons plans, only some of the participants in the experimental group indicated the usefulness of ready-made lesson plans for reducing their workloads. Omani-n teacher said:

> "*I believe the programme has changed my motivation towards teaching and planning. Giving me some examples of ready-made lesson plans has provided me with the needed educational aids and reduced my efforts in searching. It gives me the time needed for reflecting on the topics and for preparing them mentally*".

Thus, there were participants in both groups who considered their participation in the programmes as a source of burden (a high cost in implementing the programmes). However, this opinion only applies to the informants who teach at rural schools, in the case of the experimental group, while the rest of the informants in this group believe that the workload or the cost of implementing the programme was not high.

Sample Size

Furthermore, the researcher claims that the insignificant results of the standardised measures can be mainly interpreted (as in the case of the reflective practices variable) by the fact that the sample size of the study intervention is smaller than it should be. As mentioned

previously (see Chapter Eight, section 8.3.2, p.244), there may be a real effect but the effect is small and the study did not have the power to detect this. I knew this was a risk, but it could not be avoided as the required sample size (189) is bigger than the population size (156). The researcher believes that if the sample size is large enough, then the standardised measures data could indicate a different result.

8.7 Conclusion (Teachers' Motivation)

This section discusses the study's findings regarding levels of Omani 10th Grade science teachers' motivation towards teaching and planning lessons, which are at a level higher than medium, according to a seven-point Likert scale. These findings show that despite Omani science teachers' intrinsic motivation levels being high, their extrinsic motivation is higher than their intrinsic motivation. The findings also indicate that Omani female science teachers are more motivated towards planning lessons than Omani male science teachers, and the difference between them is statistically significant. Furthermore, it seems that the experimental group's programme is more suitable for female teachers who teach at urban schools, than the rest of strata. This section attempts to interpret the reasons behind these results which show that the type of training platform does not have a significant effect on science teachers' motivation towards teaching or towards planning lessons. The researcher argues that this result is likely to be due to a combination of the following factors:

1- Interaction between participants not working as intended.
2- Practising reflection and teachers' confidence.
3- Teachers' enthusiasm level.
4- Teachers' workload level.
5- The sample size of the study intervention is smaller than it would ideally be.

In fact, further research might be needed in order to fully examine these factors.

8.8 Relationship between science teachers' reflective practices and their motivation

This study explores the relationship between science teachers' reflective practices and their motivation towards teaching and planning lessons. The research questions regarding this aspect were:

- *Is there any significant association between science teachers' reflective practices and their motivation towards teaching?*
- *Is there any significant association between science teachers' reflective practices and their motivation towards planning lessons?*

The Spearman correlation coefficient test shows that there is barely above the level of significant association ($p= 0.050$) between science teachers' reflective practices and their motivation towards teaching (N= 150, $r= 0.157$, $p= 0.056$). This lack of ability to detect the presence of statistical significance could be explained due to the sample size (Figueiredo Filho, 2013). *"The larger the sample size, the higher the probability of detecting statistical significance"* (Figueiredo Filho, 2013, p.44). However, it shows that there is a statistically significant positive and weak relationship association at $p=0.050$ level between science teachers' reflective practices and their motivation towards planning lessons (N = 150, $r = 0.170$, $p = 0.038$).

Furthermore, the interview data analysis supports the claim that there is a positive relationship between teachers' reflective practices and their motivation. For example, Omani-tc teacher claims that a teacher's reflective practice level will decline if they do not have enough motivation and desire to be a good teacher.

This outcome could be supported by literature too. Wang and Ribera (2016) point out that reflective practices are associated with motivation. Pandey (2012) argues that teachers' motivation plays a role in increasing their reflective practices level. Likewise, reflective practices could lead to an increase in confidence which is directly related to motivation (Sulisworo and Suryani, 2014). Note, studies in this regard are very limited, and I found very few studies that are interested in studying this relationship. The results of this study tend to claim that there is a statistically significant positive relationship between teachers' reflective practices and their motivation.

8.9 Influences on Omani teachers' reflective practices and their motivation

The study also investigated influences that affect Omani teachers' reflective practices and their motivation towards working as teachers. The study question regarding this section is: What are the key influences associated with Omani science teachers' level of reflective practices and their motivation towards working as teachers?

The study revealed that the following influences have the most significant effects on Omani 10th Grade science teachers' reflective practices and their motivation towards working as teachers: professional development, workload-focus of attention, workload-time, and teachers' personality traits.

8.9.1 Professional development

The findings of the present study show that the majority of informants argue that they do not effectively practise reflection due to their lack of knowledge about reflective practices. Those informants blame their professional development methods that include their preparation programmes for teaching, their discussions with supervisors, their lack of reading literature, and their training (as in-service teachers). They claim that their reflective practice level does not solely rely on their continuous professional development, but also relies on their previous training programmes during the period of preparation for teaching. In fact, teachers' professional development is the fundamental path for providing teachers with new knowledge, enthusiasm, commitment, and self-confidence (Day, 1999).

However, some informants indicated that professional development in Oman (teachers' preparation, discussions with inspectors, reading in literature and training programmes) was not effective in providing them with the required knowledge for reflective practices. For instance, a few informants claimed that they were not aware of the term *reflective practice* because they had not ever heard of it during their period of preparing as a teacher, during the discussion with inspectors, or during in-service training programmes. Some of the informants who have a long period of experience clearly interpreted their inability to define the term 'reflective practice', due to their preparation as a teacher or because of their inspectors. One of them said, *"I have never heard about it, no one during the period of preparing us as a teacher, or during the discussion with inspectors, has talked about it"* (Omani-n teacher). Another female teacher interpreted this issue based on her area of reading interests *"I basically read about scientific topics"* (Omania-A$_3$ teacher). In contrast, Omani-om teacher argued that training in general does not focus on such concepts. He mentioned that, *"training of in-service teachers focuses on teaching methods and scientific topics"*. However, two participants mentioned that they might have heard this term before, but they did not remember its definition. For instance, Omania-tu teacher stated, *"This is my first year as a teacher and I'm still not familiar with a lot of educational concepts. However, I have heard about it, maybe during the preparation period for teaching but I don't know its definition"*.

It seems that only new Omani science teachers were engaged with the reflective practices term theoretically during their period of preparation as a teacher. However, it seems that it was not an important term to focus on during their preparation period, since they were not able to define it during the interview. This result, in general, is consistent with Alrumaih

(2016) which argues that the most influential factor regarding teachers' reflective practices is having the required knowledge to apply reflection.

According to the literature, it seems that there is a direct relationship between reflective practices and professional development. Reflective practice is an important tool in teachers' professional development (Fakazli and Gonen, 2017). Minott (2011) claims that this tool is so effective in identifying required professional skills, and in reinforcing these skills in order to develop teachers' practices (the ultimate goal of reflection). The capability of teachers to reflect on their practices governs the influence of professional development upon classroom teaching (Clarke, 1995). The mainstream stance among researchers assumes that reflective practice is a very important process to build, maintain, and develop the potential of teachers to think and act professionally (Day, 1999).

In terms of the effect of professional development on teachers' motivation, none of the informants claimed that professional development could be an effective strategy to foster teachers' motivation. This goes against AlRasbi's (2013) study, which was conducted in Oman. AlRasbi (2013) argues that continuing professional development might be the key for enhancing Omani in-service teachers' motivation. This finding could be a sign of the nature of the Omani teachers' professional development programmes. It seems that these programmes do not have the potential or intention to deal with teachers' motivation. This contradicts the recommendation of Claudia (2015) which asserts the requirement to prepare training programmes that keep teachers' motivation at a high level. This leads us to focus attention on the stakeholders who are responsible for preparing teachers' training programmes, to take into their account such vital elements (teachers' motivation) while preparing the training programmes.

In conclusion, many informants argue that teachers' professional development methods (both in the present and in the past) were the reason behind their lack of required knowledge for practising reflection. Thus, these methods (teachers' preparation programmes, supervisors' meeting, and in-service training programmes) must be reviewed by the stakeholders if they seriously in favour of developing motivated and reflective teachers.

8.9.2 Workload-Focus of attention

Workload affects teachers' professional development negatively (Day, Sammons, Stobart, Kington, and Gu, 2007). Heavy workloads may be the main influence for many teachers leaving the teaching profession (Minott, 2010). Chireshe and Shumba (2011)

investigated the reasons behind this lack of motivation with Zimbabwean teachers. The findings show that teachers' demotivation was due to many influences, with workload being one of them. Furthermore, Addison and Brundrett (2008) revealed that extrinsic motivators, such as workload, are the main influences that affect teachers' motivation.

It also seems that workload is one of the most important influences affecting Omani teachers' reflective practices and their motivation according to their point of views. There are many matters that teachers have to focus on. At the same time, these matters could form a workload that hinders their concentration on practising reflection, and could negatively affect their motivation. According to the New Zealand Education Consortium and the Ministry of Education (2017), influences that contribute to teacher's workload in Oman involve *"the number of assigned teaching lessons, number of assigned classes, class sizes and administrative duties"* (p.264). In the current study, Omani science teachers argue that key sources of their workload are as follows: the number of assigned teaching lessons per week, curriculum (curriculum size and difficulties of topics), lack in teaching aids, students (class size, students' motivation, students behaviour, students' desire to learn), and administrative duties.

Despite indications that the average assigned teaching lessons per week for many Omani teachers is between 15-19 hours (Education Council, 2014) and the average of assigned teaching lessons per week for Omani science teachers is 15 hours (the New Zealand Education Consortium and the Ministry of Education, 2017), many informants claim that their teaching hours per week hinder them from focusing on their professional development, especially regarding practising reflection. They also claim that this type of workload negatively affects their motivation towards teaching and planning lessons. A few informants argued that the average teaching hours per week increases if a colleague is absent from work for a long period of time, due to illness or due to any other issues. For example, Omani-11 teacher asked for to find a solution for this type of issue. He also said: *"Stop asking a teacher to take care of their colleague's classroom if they are absent"*.

Another type of workload was teaching too many curricula (two or more). The Ministry of Education in Oman employs many teachers annually. Many new teachers are often distributed to schools located in rural areas (the New Zealand Education Consortium and the Ministry of Education, 2017). In these schools, teachers usually teach two curricula and more, which is a great burden, especially if the teachers are inexperienced. The burden of

planning their lessons is great. Gu, Heesom, Williamson, and Crowther (2018) consider planning high quality lessons as being the highest workload component for teachers since it requires time and focus. Thus, it is natural in this case that teachers in rural areas find themselves in an unsuitable condition to increase their reflective practice or their motivation. Minott (2010) draws attention to the need for a reduction in the workload burden that lesson plans add to teachers. He suggests employing technology in order to solve this issue. Besides, Gu, et al. (2018) claim that conducting collaborative planning can reduce teachers' workloads, and positively affect their quality of teaching.

Guajardo (2011) argues that, *"If teachers' workloads are greater than their motivational support, teacher motivation is threatened"* (p.9). According to some of the informants, the availability of teaching aids and teaching materials represents a motivational support for them. For example, Omani-i teacher, as well as four other informants in the experimental group, contended the need for providing teaching aids and teaching materials for teachers in order to increase their motivation.

In terms of students as a workload, many informants considered working with students as a workload source, which contradicts AlRasbi's (2013) claim that working with students is a source of reward and satisfaction according to the study's informants. Some of the informants of the current study think that the number of students in the classroom is too high and needs to be reduced. They also believe that dealing with a large number of students and their problems may exhaust them and reduce their efforts in practising reflection, while others considered that working with students itself is a great burden, due to the students' lack of motivation towards learning, as well as bad behaviour from some of them. Minott (2010) points out that students' bad behaviour could be an issue for teachers all over the world. This could lead to a decline in teachers' motivation, as Han and Mahzoun (2017) show, that the main reason for teachers' demotivation at work is a lack of respect from students. Omani-n teacher said:

> *"I had high motivation when I started teaching; I can say 9 out of 10 but now after 19 years of teaching my motivation is very low may be 5 out of 10. The main reasons are students' bad behaviours and students' academic level is very low. They have a very low motivation to learn".*

According to Alrumaih (2016), students' bad behaviour negatively affects teachers' reflective practice too. This means that if teachers exert much effort into dealing with such issues, then this may negatively affect their motivational and reflection levels. Furthermore, it

seems that some informants believe that there is an association between students' academic achievements and teachers' reflective practices. It could be possible that having students with a high level of achievement puts more responsibility on teachers, and enhances their reflective practice levels in order to match students' levels. This result is consistent with Kheirzadeh and Sistani (2018) who indicate that there is a positive association between teachers' reflective practices and students' achievement.

Having too many teaching and administrative duties probably reduces the benefits of participating in a professional development programme (Al-Ghatrifi, 2016). So, if the programme is designed to increase teachers' reflective practices and their motivation, the workload may hinder their achievement of these goals. In terms of administrative duties as a workload, Minott (2010) believes that hiring more staff who are concerned with administrative aspects may be necessary in order to rid teachers of these aspects that hinder their efforts in teaching and planning processes. A few informants asked to be allowed to focus on teaching only, which could be accomplished by providing extra employees in schools in order to deal with administrative aspects, instead of teachers dealing with this area. This seems to be an annoying issue for many teachers, especially female teachers who seem to avoid changing their positions as teachers and believe that there is no need for the potential benefits (upgrading and changing their positions) as a result of working with the school administration. For instance, a female teacher (Omania-5) asked for a reduction in her administrative load. Another female teacher (Omania-A_1) claimed that she is not interested in administrative aspects. This is may be due to factors associated with the prevailing culture that the most suitable job role for women is a school teacher, in order to reduce undesired contact with males.

I would argue that the desire of many female teachers to remain in their position and, in contrast, the striving of male teachers to change their position, may explain many of studies' findings that indicate the superiority of female teachers to males in many aspects.

The study concludes that teachers' workload does not negatively affect teachers' professional development only, but it also has a crucial effect on their motivation. The informants in the current study argue that the key sources of their workload are the number of assigned teaching lessons per week, curriculum, lack of teaching aids, students, and administrative duties.

8.9.3 Workload-Time

It was clear that the informants of the current study think that time plays an important role in teachers' reflective practices. A few informants emphasise that practising reflection during the school day requires time. Neville and Smith (1995) contend that time is required for improving reflection. Teachers have to be provided with sufficient time in order to practise reflection effectively if stakeholders are seriously interested in improving their reflective practices (McNamara, 1990).

Some of informants assert that sufficient time for practising reflection is not available in the school context since they are continuously engaged in implementing teaching and administrative tasks (workload). Kempf (2014) argues that workload at school could negatively affect taking time for practising reflection on teaching and learning processes. McNamara's (1990) study supports this claim. It asserts that teachers have insufficient time for practising reflection when they are in a school environment.

However, I would argue that teachers may acquire the required time for practising reflection if they manage their time wisely. In fact, practising reflection does not need many hours. A few minutes could be sufficient for implementing many of the reflective practice steps. I would also argue that using mobile technology could be helpful in solving time issues for teachers since it provides them with the needed flexibility in time and location. In conclusion, according to some of the informants, workload-time is one of the major obstacles regarding practising reflection.

8.9.4 Teachers' personality traits

Although motivation depends heavily on individuals' personalities which are extremely varied, it is hard to determine the best way to strengthen and stimulate employees' motivation because of differences in the influences on their motivations (Hollyforde and Whiddett, 2002). Teacher motivation, teacher commitment, teacher conscience, teacher ability to form good relationships with administration and colleagues, and work satisfaction are some of the teachers' main personality traits that affect their reflection and motivation, according to the respondents of the current study.

Despite the fact that the role of personality variables in the majority of motivation theories is limited (Judge and Ilies, 2002), De Sevin (2009) and Lumanisa (2015) argue that motivation is associated with personality traits. The differences in personalities demand different motivational tools (Bencsik, Machova, and Hevesi, 2016). Likewise, reflection is also associated with personality traits. Safarie and Tarlani-aliabadi (2014) reveal that certain

components of teaching reflection are linked with personality type. For example, commitment is one of these personality traits. Omani-l teacher argues that in order to be a reflective practitioner *"you must love what you are doing and you have to have a commitment to do things correctly"*. It is not easy to observe teachers' efforts and evaluate their performance all of the time. In fact, we need to rely on their commitment. Thus, teacher commitment plays a crucial role in achieving educational goals (Firestone and Pennell, 1993). Renandya (2015) argues that commitment is a sign of motivation. Firestone and Pennell (1993) assert that students' achievement, working conditions, and getting feedback have significant and direct relationships with teacher commitment. Further, they contend that a well-prepared professional programme that provides learning opportunities could enhance teacher commitment. According to them, teacher commitment occurs when the teachers takes responsibility for the outcomes of their work. They will be more motivated if they succeed, and will change their actions if they fail (Deci and Ryan, 1985).

Furthermore, the ability to create good relationships with administration and teaching colleagues is an important personality trait of teachers, which can increase their motivation. However, if a teacher does not possess this ability, then their motivation towards teaching may be impacted negatively. Han and Mahzoun (2017) consider the bad relationship between teachers, school administration, and colleagues as demotivating influences for teachers. In general, teachers' personality traits play a vital role in their motivations (Hollyforde and Whiddett, 2002).

Conclusion

The current study argues that there is a positive relationship between teachers' reflective practices and their motivation towards planning lessons. It points out that influences that affect Omani science teachers' reflective practices and their motivation towards working as teachers are the following: professional development methods, workload-focus of attention, workload-time, and teachers' personality traits.

8.10 Summary of the Chapter

The current study's first aim is to reveal the extent to which Omani science teachers are reflective and motivated towards teaching and planning lessons. The analysis of baseline data and the interview data leads us to conclude that Omani science teachers believe that they are at the medium level of practising reflection, according to a five-point Likert scale, and at a level higher than medium according to a seven-point Likert scale, regarding motivation towards teaching and planning lessons. The current study's results show that Omani female science teachers practise reflection significantly more than Omani male science teachers. The results also indicate that Omani female science teachers are more motivated towards planning lessons than Omani male science teachers, and the difference between them is statistically significant.

The second aim is to explore the impact of using mobile technology on teachers' reflective practices and their motivation towards teaching and planning lessons. The study's findings indicate that, despite the experimental group programme being considered as useful for improving teachers' reflective practice and motivation (according to many informants), the standardised measures data show that the differences between the study groups in their reflective practice and their motivation are not statistically significant. The researcher concludes that the findings regarding the effect of the intervention on teachers' reflective practices is probably due to a combination of the following factors:

1- The sample size of the study intervention is smaller than it would ideally be.
2- Methods of preparing and training teachers do not encourage them to be reflective.
3- The resistance to change of senior teachers, inspectors, and principals.
4- The interaction between participants did not work as intended.
5- Some participants might struggle to maintain the required commitment to the training programme.

The researcher also concludes that the findings regarding the effect of the intervention on teachers' motivation is probably due to a combination of the following factors:

1- Interaction between participants did not work as intended.
2- Practising reflection and teachers' confidence.
3- Teachers' enthusiasm levels.
4- Teachers' workload levels.
5- The sample size of the study intervention is smaller than it would ideally be.

Finally, the study identifies the relationship between teachers' reflective practices and their motivation towards teaching and planning lessons, and influences that affect teachers' reflective practices, and their motivation towards working as teachers. The results show that there is a positive relationship between teachers' reflective practices and their motivation towards planning lessons. According to the results, the following influences affect Omani science teachers' reflective practices and their motivation towards working as teachers: professional development, workload-focus of attention, workload-time, and teachers' personality traits.

Chapter Nine: Conclusion

Introduction

The current chapter starts with a summary of the aims and results of the study. It then addresses its contributions and implications in the educational field. Next, the limitations of the study and further research recommendations are presented. The chapter then presents the final conclusion of the study.

9.1 Summary of Aims and Results of the Study

This study describes using mobile technologies as a platform for the purpose of teachers' professional development. It focuses on three main issues. First, it reveals the extent to which Omani science teachers reflect and are motivated towards teaching and planning lessons. Second, it shows the impact of the training programme on teachers' reflective practices and their motivation towards teaching and planning lessons. This training programme, hosted mainly on two mobile applications (Twitter and Facebook), was designed based on two models of reflection (Kolb's Cycle and Gibb's Cycle), as well as on a motivational theory known as the Expectancy-Value theory. Finally, the study identifies the relationship between teachers' reflective practices and their motivation towards planning lessons, and factors that affect teachers' reflective practices and their motivation towards working as teachers.

The study took place in the Al Batinah-North Governorate of the Sultanate of Oman. A total of 83 Omani science teachers were involved in implementing the activities of the study, which lasted for 14 weeks. This study relied on a pre-post experimental design of three groups to ensure the proper assessment of the mobile technology programme's effectiveness. Questionnaires, interviews, and document analyses were employed in order to obtain the study's findings.

Findings (from baseline data and interview data) show that according to the perspectives of Omani science teachers, they practise reflection at a medium level according to a five-point Likert scale, and they are at a level higher than medium, according to a seven-point Likert scale regarding their motivation towards teaching and planning lessons. Additionally, there is a statistically significant difference in the mean reflective practice scores between male and female teachers. Hence, Omani female teachers practise reflection more than Omani male teachers. Furthermore, the mean scores of motivation of Omani

female science teachers towards planning lessons are higher than the mean scores of motivation of Omani male science teachers. The pattern of these findings is statistically significant.

The findings from the interview data and activities data indicate that in general using mobile applications as training platforms with a specific programme has improved teachers' reflective practices and their motivation towards teaching and planning lessons, more than other training programmes (using workbooks and mobile apps without a specific programme). This pattern is not statistically significant, according to the standardised measures data.

The results also show that there is a weak but significant correlation between teachers' reflective practices and their motivation towards planning lessons. However, the correlation is not significant in the case of the relationship between teachers' reflective practices and their motivation towards teaching. The analysis of interview data determined influences that may affect teachers' reflective practices and their motivation towards working as teachers as follows, professional development, workload-focus of attention, workload-time, and teachers' personality traits.

9.2 The Study Contributions

The fundamental goal of this study is to explore the potential of using mobile technology for in-service teachers' professional development in Oman. Thus, the essential contextual contribution of this study is that it is one of the rare local studies in Oman that draws attention to the benefits of employing mobile technology in the area of in-service teachers' professional development. Furthermore, it appears to be the first local study which suggests using Facebook and Twitter apps for that purpose.

The results of this study could also contribute to the reform of in-service teacher training methods and strategies. The Ministry of Education has made much effort and examined several proposals in order to facilitate in-service teacher training programmes. Perhaps the most recent proposal is the establishment of the Specialised Centre for Professional Training of Teachers on June 2014. This centre is located in the capital (Muscat) and requires large sums of money to create the necessary conditions (housing, transportation and nutrition) to train teachers and inspectors who come from the different regions of the Sultanate. The findings of this study provide alternatives that could help to reduce these loads, and to expand numbers of participants in training programmes. The findings of the

current study also provide different approaches for educational inspectors to implement their workshops. This study could be one of a few studies in the Arabian world that attempts to suggest an acceptable environment (the virtual environment) for interaction between male and female teachers in order to overcome the constraints of Arabian traditions and culture (especially in the Arabian Gulf area).

Many studies employed virtual environments, such as online sites, blogs, chat rooms, e-portfolio, e-journals, and forums on improving teachers' reflective practices (Kirk, 2000; Bodzin and Park, 2002; Ray and Hocutt, 2005; Hung, 2008; Yang, 2009; Collin and Karsenti, 2012; Farr and Riordan, 2015; Nambiar and Thang, 2016; Salinas-Grandy, 2016). However, there is a dearth of studies that focused on using mobile technology to improve teachers' reflective practices. Hence, in terms of knowledge contribution, this study is unusual in utilising mobile technology for in-service teacher training programmes, especially, regarding the improvement of teachers' reflective practices. Additionally, this study could be one of the rare studies that suggests using Facebook and Twitter as an educational platform through mobile technology.

In terms of teachers' reflective practices and motivation, this study provides a considerable contribution to the knowledge related to them in the context of Oman and at regional level. It contributes to improving Omani in-service teacher professional development programme methods through applying reflective approaches. Furthermore, there are not many studies that attempt to reveal the relationship between teachers' reflective practices and their motivation, which are crucial components of any programme concerned with teachers' professional development. This study integrates between two models of reflective practices (Kolb's Cycle and Gibb's Cycle) and a theory of motivation (the Expectancy-Value theory) in order to improve both teachers' reflective practices and their motivation. Finally, the study has added to the knowledge that focuses on revealing factors that affect teachers' reflective practices and their motivation.

9.3 The Implications of the Study

The findings of this study lead to suggest several implications for stakeholders in the educational field, especially in the Sultanate of Oman. First, mobile technology could be considered as a possible means of solving problems relating to the training sector in Oman, particularly regarding the high cost of implementing these training programmes or regarding the undesirable hardship that teachers suffer for reaching training centres. Second, employing

mobile technology for the purpose of in-service teachers' training requires plans and preparations starting with educating teachers and trainers on how to use such technology practically. When preparing a training programme, it is crucial to choose training activities that are important, enjoyable, useful and do not involve great difficulties in being implemented. Participants should be assigned to these programmes based on their needs. It is important to avoid putting participants in programmes which do not fit with their particular needs.

Besides, there seems to be a necessity to change the approach of new teachers' preparation programmes from the traditional approach that focuses on providing pre-service teachers with the necessary scientific and educational knowledge, to an approach that adopts reflection. It is also time to start preparing training programmes through mobile technology or through any means which provide an interest in developing teachers' reflective practices and their motivation.

In addition, school principals, inspectors, and headteachers should be fully aware of the importance of promoting teachers' reflective practices and their motivation. It is, therefore, vital to prepare training programmes that aim to develop the strategies of school principals, inspectors, and headteachers in improving teachers' reflective practices and motivation. Many informants have claimed that there is not enough time to practise reflection. So, I propose to devote one hour per week during school time to practise reflection with colleagues on a particular topic under the supervision of a headteacher.

There is a noteworthy but not fundamental finding. Some strata of the study benefited some more than others from using mobile technology to develop their reflective practices and motivation. Thus, using mobile technology as training platform may fit with some strata of participants and may not fit with other strata. I suggest taking this into account when preparing training programmes that address teachers' professional development.

Furthermore, I think that the Ministry of Education in Oman should conduct a comprehensive review of the existing education system, which appears to involve many constraints and pressures that significantly affect the motivation and reflective practice levels of teachers. Adopting the idea of an assistant teacher could be helpful to overcome issues in these fields. A large number of Omani male science teachers point to workload related to pupils' behaviour and their academic levels, which in turn reduces their motivation to perform to their full potential in their role as a teacher. It seems that it is necessary to find

clear proposals in this regard. For example, the Ministry of Education in Oman should activate the role of parents and guardians more and facilitate their participation in order to find appropriate solutions for their children's bad behaviour. The Ministry could employ mobile applications for linking teachers with parents and guardians, and for facilitating the dialogue between them.

Furthermore, teachers' motivation seems to be a complex and constantly changing issue. Thus, training programmes for school principals, inspectors and in-service teachers should focus more on dealing with this issue. A school environment that involves a good relationship between teachers, school principals and colleagues is vital in order to hold a strong basis to urge teachers to put in more effort to develop teaching and learning processes. It is also necessary to involve as many teachers as possible to make decisions relating to the reform of the educational system. It is not appropriate that the role of teachers is solely implementing instructions issued by higher authorities.

Finally, the results of the current study indicate that teachers' personality traits play an important role in the process of developing their reflective practices and thus developing their teaching skills. Therefore, when choosing new teachers, it is necessary to adopt attributes such as commitment, self-confidence and willingness to work with students as important criteria in approving their employment.

9.4 The Study Limitations

This study is a preliminary study aimed at determining the impact of using mobile technology on Omani teachers' reflective practices and their motivation towards teaching and towards lessons planning. It had some constraints and limitations which compromised some aspects of the study, as follows:

- The sample size of the study intervention was 83 participants, which is smaller than it should ideally be. The estimation of the necessary sample size showed that it should be at least 189 participants, which is bigger than the study population size of 156. There may be a real effect, but the effect is small and the study did not have the statistical power to detect it. This was a risk, but I could not avoid it since the required sample size was bigger than the population size of the study.

- Five participants were supervised by the researcher over a long period of time in his role as inspector. Therefore, their responses might be influenced by their relationship with him.

- There were missing answers from some of the participants in various activities which made it somehow difficult to compare between the experimental group and control group1 regarding their engagement in the activities. They may have performed the reflection step, but they did not include the necessary answer to confirm that.

- A few rural areas have weak internet coverage. The effect of the difference in the strength of internet coverage between areas has not been taken into account.

- There are some factors that the study did not take into account, such as the impact of the differences in the smartphone screen size and the impact of the differences in the type of smartphone device.

- The study focused only on teachers who work at state schools, while teachers who work at private schools were not included.

The researcher feels that the most influential limitation on the study's findings was the sample size of the study intervention. If the sample size was large enough, then the standardised measures data could indicate a different result.

9.5 Further Research Recommendations

This research is interested in the following areas - determining Omani science teachers' reflective practices and motivation, employing mobile technology in teachers' professional development, focusing on the importance of the reflective practice approach in teachers' preparation and training programmes, and focusing on the importance of motivation for the success of teaching and learning processes. However, there were many issues that were not within the scope of this thesis, although they could be worthy of research:

1. The use of the internet was employed through mobile technology in this study, in order to improve teachers' reflective practices, while many studies, for the same purpose, use the internet through desktop computers. A comparative study is recommended to show which method is more effective in developing teachers' reflective practices.

2. This study attempted to reveal the impact of using mobile technology on in-service teachers' reflective practices and their motivation. The same study can be repeated but through utilising different groups of participants, such as pre-service teachers. The purpose of this would be to discover the impact of contextual change on the effectiveness of employing mobile technology.

3. The study has attempted, as part of its contribution to proposing an appropriate environment for interaction between male and female teachers, to overcome the constraints of achieving this due to the Arabian tradition and culture. Thus, the population of the study was a mix of males and females. However, I suggest repeating the same study but rather by using study samples of only one sex (male teachers only or female teachers only). This is in order to explore the impact of gender on the effectiveness of the provided professional development programmes.

4. Many professional development programmes, especially in Oman, are concerned with improving teachers' abilities associated with teaching methods. Mobile technology includes many applications that can help in this field, such as the YouTube app. Thus, I suggest a study to examine the effect of using a mobile technology-based professional development programme in order to improve effectiveness of teaching methods.

5. I think that now is the time to allow mobile technology to enter schools and to adopt its applications as educational platforms, according to certain criteria. I suggest undertaking a study aimed at identifying those criteria for teachers and pupils.

6. In the Omani educational field, many mobile applications are used, such as WhatsApp, in the exchange of scientific and instructional information between colleagues, whether they are inspectors or teachers. However, there is a dearth of studies that shed light on the positives and negatives of such approaches. I suggest conducting a study to illuminate the impact of such virtual environment communities on participants' motivation towards work.

7. It seems that the open availability of participants' identities could be a significant factor that may affect participants' engagement in activities, and their interactions with others. As a consequence, it may affect the improvement in their reflective practice levels. Thus, I suggest a study to examine the effect of knowing participants' identities (in a training programme) on teachers' reflective practice levels.

8. In the literature, many studies generally reveal the importance of teachers' motivation due to its association with student achievement. However, it seems that most researchers do not focus on studying the motivations of school principals or inspectors and its impact on teachers' performance or their motivation. I suggest a study to explore the impact of school principals' motivation or inspectors' motivation on teachers' performance and motivation.

9. Some of the participants were satisfied with having ready-made lesson plans. I therefore suggest conducting a study on the impact of providing teachers with ready-made lessons plans on their reflective practices and their motivation.

10. According to Richardson et al. (2014) and Hiver et Al. (2018), the Expectancy-Value theory, the Achievement Goal theory, and the Self-determination theory are the main motivational theories that are adapted in order to highlight and to explore teachers' motivation empirically. The motivation-related part in the activities of the current study was designed based on the Expectancy-Value Theory. The same study can be performed to explore the effect of adopting other theories on teachers' motivation.

9.6 Final Conclusion

This study has contributed to the Omani context and the regional context in many aspects, as explained above. In relation to Omani science teachers' reflective practices and their motivation, this study shows that they practise reflection at a medium level, according to a five-point Likert scale, and they are at a level higher than medium, according to a seven-point Likert scale regarding their motivation towards teaching and planning lessons. The study also adds a considerable contribution to our understanding of employing mobile technology regarding teachers' professional development. Indeed, the study underpins the mainstream claims that mobile technology could be one of the most beneficial educational platforms for improving learning and teaching processes. Finally, the study sheds light on influences that affect teachers' reflective practices and their motivation.

The following are the study questions, the data sources which were used in order to answer them, and their findings:

1- To what extent do science teachers in the North AL Batinah Region of the Sultanate of Oman: A. Practise reflective teaching?   B. Show motivation towards teaching and planning lessons?

The data sources for this question were questionnaires and interviews. The findings show that Omani science teachers are at a medium level of practising reflection, according to a five-point Likert scale and they are at a level higher than medium, according to a seven-point Likert scale regarding their motivation towards teaching and planning lessons.

2- What are the key influences associated with science teachers' levels of reflective practice and their motivation towards working as teachers?

The data source for this question was interviews. The analysis of the interview data shows that influences that may affect teachers' reflective practices and their motivation towards working as teachers are - professional development, workload-focus of attention, workload-time, and teachers' personality traits.

3- Is there any significant association between science teachers' reflective practices and their motivation towards: A. Teaching?   B. Planning lessons?

The data sources for this question were questionnaires. The findings indicate that there is a weak but significant correlation between teachers' reflective practices and their motivation towards planning lessons (N = 150, $r = 0.170$, $p = 0.038$). However, the correlation is barely above the level of significance ($p = 0.050$) between science teachers' reflective practices and their motivation towards teaching (N = 150, $r = 0.157$, $p = 0.056$).

4- What is the impact of using mobile technology as a training platform on science teachers' - A. Reflective practices?   B. Motivation towards: a. teaching? b. planning lessons?

The data sources for this question were questionnaires, interviews, and activities analyses. Although the standardised measures data indicate that the study intervention has a statistically insignificant impact on teachers' reflective practices and their motivation towards teaching and planning lessons, the interview data and activities data indicate that the impact was positive. In general, using mobile applications as training platforms with a specific programme has improved teachers' reflective practices and their motivation towards teaching and planning lessons, more so than other training programmes (such as using workbooks, and using mobile applications without a specific programme).

References

Abachi, H. R., & Muhammad, G. (2014). The impact of m-learning technology on students and educators. *Computers in Human Behavior, 30, 491–496.*

Abass, F. (2008). Cooperative learning and motivation. *Language and Culture, 18(1), 15-35.*

Achim, I. M., Dragolea, L., & Balan, G. (2013). The importance of employee motivation to increase organizational performance. *Annales Universitatis Apulensis: Series Oeconomica, 15(2), 685- 691.*

Adamson, K. A., & Prion, S. (2014). Making sense of methods and measurement: Normal curve. *Clinical Simulation in Nursing, 10, e333.*

Addison, R., & Brundrett, M. (2008). Motivation and demotivation of teachers in primary schools: the challenge of change. *Education 3-13, 36(1), 79 -94.*

Ahmad, N., & Al-Khanjari, Z. (2011). Effect of Moodle on learning: An Oman perception. *International Journal of Digital Information and Wireless Communications (IJDIWC), 1(4), 746-752.*

Ahmed, E. W., & Al-Khalili, K. Y. (2013). The impact of using reflective teaching approach on developing teaching skills of primary science student teachers. *The Online Journal of New Horizons in Education, 3(2), 58-64.*

Ahmad, I., Said, H. B., Zeb, A., ur Rehman, S., Ahmad, S., & Khan, W. (2013). How reflective practices improve teachers' classroom teaching skill? Case of community based schools in District Chitral, Khyber Pakhtunkhwa. *Academic Research International, 4(1), 73-81.*

Airasian, P. W., & Gay, L. R. (2003). *Educational research: Competencies for analysis and application, 7th Edition.* Upper Saddle River, NJ: Merrill-Prentice Hall.

Akbari, R. (2007). Reflections on reflection: A critical appraisal of reflective practices in L2 teacher education. *System, 35(2), 192-207.*

Akbari, R., & Allvar, N. K. (2010). L2 teacher characteristics as predictors of students' academic achievement. *TESL-EJ, 13(4), 1-21.*

Akbari, R., Behzadpoor, F., & Dadvand, B. (2010). Development of English language teaching reflection inventory. *System, 38(2), 211–227.*

Akhshabi, M., Khalatbari, J., & Akhshabi, M. (2011). An experiment on conducting mobile learning activities on the virtual university. *Procedia - Social and Behavioral Sciences, 28, 384–389.*

Alam, M., & Farid, S. (2011). Factors affecting teachers' motivation. *International Journal of Business and Social Science, 2(1), 298-304.*

Al-Ani, W., Al barwani, T., & Al-Balushi, S. (2012). Defining effective teaching in Oman: Searching for consensus? *Educational Research, 3(1), p. 87-96.*

Al Bahrani, A., (2008). *The impact of e-supervision, by using Moodle as supervision tool on pre-service teachers' practices and reflection.* Unpublished Master thesis, Sultan Qaboos University, Oman.

Al-Balushi S. M. & Ambusaidi A. (2015). Science education research in the Sultanate of Oman: The representation and diversification of socio-cultural factors and contexts. In Mansour, N. & Al-Shamrani, S. (Eds.), *Science education in the Arab Gulf states: Visions, sociocultural contexts, and challenges (p. 23-47).* The Netherlands, Rotterdam: Sense Publishers.

Al Barwani, T. (2002). Bridging the gap between secondary education, higher education, and the world of work. *In International Conference on Secondary Education, Muscat, Oman, 22-24 December, 2002.*

Aldahmash, A. H., Alshmrani, S. M., & Almufti, A. N. (2017). Secondary school science teachers'

views about their reflective practices. *Journal of Teacher Education for Sustainability, 19(1), 43-53.*

Al-Farsi, S. (2007). *Omani School Head Teachers Views of Effectiveness of School Leadership of Secondary.* PhD thesis, University of Glasgow, UK.

Al-Ghatrifi, Y. (2016). *The professional development of teachers in higher education in Oman: A case study of English teachers in the Colleges of Applied Sciences.* PhD thesis, University of Reading, UK.

Al Hajri, N. (2014). A Proposed Model for Improving Supervisory Practices of Educational Supervisors in the Ministry of Education in the Sultanate of Oman. Master thesis, University of Nizwa, The Sultanate of Oman. Retrieved on December, 5, 2016, from http://www.unizwa.edu.om/content _files/a47921029.pdf.

Al-Issa, A. S. (2008). The implications of the teacher training program to the ELT policy implementation in Oman. *The Journal of Asia TEFL, 5(2), 59-92.*

Ali, A. Y., Dahie, A. M., & Ali, A. A. (2016). Teacher motivation and school performance, the mediating effect of job satisfaction: Survey from Secondary schools in Mogadishu. *International Journal of Education and Social Science, 3(1), 24-38.*

Ali, M., Yaacob, R. A., Endut, M. N., & Langove, N. U. (2016). Strengthening the academic usage of social media: An exploratory study. *Journal of King Saud University-Computer and Information Sciences, 29, 553-561.*

Al Jabri, M. J. H., Silvennoinen, H., & Griffiths, D. (2018). Teachers' professional development in Oman: Challenges, efforts and solutions. *International Journal of Learning, Teaching and Educational Research, 17(5), 82-103.*

Al-Kindi, S. S. & Al-Suqri, M. N (2017). Mobilizing learning: Using moodle and online tools via smartphones. *International Journal of Knowledge Content Development & Technology, 7(3), pp.67-86.*

Al-Lamki, N. (2009). *The beliefs and practices related to continuous professional development of teachers of English in Oman.* Unpublished PhD thesis, Leeds University, UK.

Ally, M. (2009). *Mobile learning: Transforming the delivery of education and training.* Athabasca: Athabasca University Press.

Al-Maamari, S. (2014). Education for developing a global Omani citizen: Current practices and challenges. *Journal of Education and Training Studies, 2(3), 108-117.*

Al Musawi, A. S., & Abdelraheem, A. Y. (2004). E-learning at Sultan Qaboos University: Status and future. *British Journal of Educational Technology, 35(3), 363-367.*

Alrasbi, H. N. (2013). *The motivation of Omani school teachers.* Unpublished Doctoral thesis, The University of Edinburgh, UK.

Alrumaih, B. (2016). *Developing supervision : A study on improvement reflection in pre-service teachers in KSM University.* PhD thesis, University of East Anglia, UK.

Alrasheedi, M. and Capretz, L.F (2013). An M-Learning maturity model for the educational sector. *Electrical and Computer Engineering Publications. Paper 17.* Retrieved on September, 20, 2017, from https://ir.lib.uwo.ca/cgi/viewcontent.cgi?article=1065&context=electricalpub .

Al Shabibi, A. (2013). *Omani English language teachers' first year in the classroom.* PhD thesis, University of Leeds, UK.

Al Shabibi, A. & Silvennoinen, H. (2018). Challenges in education system affecting teacher professional development in Oman. *Athens Journal of Education, 5(3), 261–282.*

Alshandudi, H. (2017). *Teachers' self-perceptions of their professional learning in the context of recent educational reforms in Oman.* PhD thesis, University of Reading, UK.

Alshaqsi, H., & Ambusaidi, A. (2018). The most common patterns of classroom dialogue used by science teachers in Omani cycle two schools. *International Journal of Instruction, 11(1), 255-268.*

Al Tayyar, K. (2014). *Job satisfaction and motivation amongst secondary school teachers in Saudi Arabia.* PhD thesis, University of York. UK.

Althunibat, A. (2015). Determining the factors influencing students' intention to use m-learning in Jordan higher education. *Computers in Human Behavior, 52, 65-71.*

Alyahmadi, H. H., & Alabri, S. S. (2013). Using NVIVO for data analysis in qualitative research. *International Interdisciplinary Journal of Education, 2(2), 181–186.*

Alyahmadi, H., & Al-Kiyumi, A. (2014). The consequences of teacher evaluation on teacher professional development in Oman. *International Journal of Education and Research, 2(4), 127-142.*

Amadi, M. N. (2013). In-service training and professional development of teachers in Nigeria: Through open and distance education. *Bulgarian Comparative Education Society.* Retrieved on January, 25, 2018, from https://files.eric.ed.gov/fulltext/ED567172.pdf.

Ambusaidi, A. & Al-Farei, K. (2017). Investigating Omani science teachers' attitudes towards teaching science: The role of gender and teaching experiences. *International Journal of Science and Mathematics Education, 15(1), 71-88.*

Ambusaidi, A. & Al- Rashdi, T. (2012). Science teachers' attitude towards using science reading in the classroom and its relations to some educational variables. *Journal of University of Damascus for Educational and psychological Sciences, 28(2), 315-345.*

Amirkhanova, K. M., Ageeva, A. V., & Fakhretdinov, R. M. (2016). Enhancing students learning motivation through reflective journal writing. *The European Proceedings of Social and Behavioural Sciences, Ep-SBS, p.14-18.* Retrieved on April, 2, 2018, from https://www.futureacademy.org.uk/files/images/upload/3IFTE2016F.pdf .

Anderman, E. & Anderman, L. (2010). *Classroom motivation.* Ohio: PEARSON.

Ansarin, A. A., Farrokhi, F., & Rahmani, M. (2015). Iranian EFL teachers' reflection levels: The role of gender, experience, and qualifications. *The Asian Journal of Applied Linguistics, 2(2), 140-155.*

Antonenko, P., Toy, S., & Niederhauser, D. (2004). *Modular Object-Oriented Dynamic Learning Environment: What Open Source Has to Offer?* Eric Document Reproduction Services No. ED485088). Retrieved on May, 22, 2018 from https://files.eric.ed.gov/fulltext/ED485088.pdf.

Arksey, H., & Knight, P. T. (2011). *Interviewing for social scientists*. London: Sage.

Ashraf, H., Samir, A., & Yazdi, M. T. (2016). Reflective teaching practice in an EFL context: A qualitative study. *International Journal of English Linguistics, 6(7), 48-58.*

Aubusson, P., Schuck, S., & Burden, K. (2009). Mobile learning for teacher professional learning: Benefits, obstacles and issues. *ALT-J: Research in Learning Technology, 17(3), 233-247.*

Awang, Z., Afthanorhan, A., &Mamat, M. (2016). The Likert scale analysis using parametric based Structural Equation Modeling (SEM). *Computational Methods in Social Sciences, 4(1), 13-21.*

Bani Khalaf, M. (2008). The level of practising aspects of happy teaching by science teachers from the viewpoint of tenth grade students. *Jordanian Journal in Science Education, 4 (1), 1-14.* Retrieved on February, 6, 2017, from http://journals.yu.edu.jo/jjes/Issues/2008/Vol4No1.pdf.

Banister, S. (2007). Ethical issues and qualitative methods in the 21st century: how can digital technologies be embraced in the research community? *Journal of Ethnographic and Qualitative*

Research, 1 (1), 1-10.

Barbour, R. (2013). *Introducing qualitative research: a student's guide*. Sage.

Barreiro, P. L. & Albandoz, J.P. (2001). Population and sample. Sampling techniques. *Management Mathematics for European Schools, 1-18.* Retrieved on March, 24, 2016, from: https://pdfs.semanticscholar.org/6d37/62e85a877163c7f02306d169f5b7ebd4632d.pdf.

Baron, R. (1991). Motivation in work settings: Reflections on the core of organizational research. *Motivation and Emotion, 15 (1), 1-8.* Retrieved on April, 4, 2017, from https://link-springer-com.libproxy.york.ac.uk/content/pdf/10.1007%2FBF00991472.pdf

Baugh, J. B., Hallcom, A. S., & Harris, M. E. (2010). Computer assisted qualitative data analysis software: a practical perspective for applied research. *Revista Digital Del Instituto Internacional de Costos, (6), 69-81.*

Bayat, A., & Molanaie, A., (2016). Characteristics of an effective test from the perspective of high reflective teachers: case of Iranian EFL teachers. *International Journal of Educational Investigations, 3(1), 86-102.*

Bencsik, A., Machova, R., & Hevesi, E. (2016). The relation between motivation and personality types. *International Business Management, 10(3), 183-193.*

Bennett, R. (2010). Going Mobile: Technology and policy issues in the mobile internet. *Information Technology and Innovation Foundation (ITIF), 46.* Retrieved on March, 12, 2017, from http://www.itif.org/files/100302_GoingMobile.pdf.

Bergsteiner, H., Avery, G. C., & Neumann, R. (2010). Kolb's experiential learning model: Critique from a modelling perspective. *Studies in Continuing Education, 32, 29-46.*

Bernard, H. R. & Ryan, G. W. (2010). *Analyzing qualitative data: Systematic approaches.* SAGE publications.

Bicaj, A., & Treska, T. (2014). The effect of teacher professional development in raising the quality of teaching (pilot research). *Academic Journal of Interdisciplinary Studies, 3(6), 369-378.*

Bicaku-Cekrezi, R. (2015). The relationship between motivation and other dimensions of classroom management and foreign language acquisition. *European Journal of Research and Reflection in Educational Sciences, 3(4), 78-88.*

Bidin, S., & Ziden, A. A. (2013). Adoption and application of mobile learning in the education industry. *Procedia-Social and Behavioral Science, 90, 720–729.*

Bista, K. (2015). Is Twitter a pedagogical tool in higher Education? Perspectives of education graduate students. *Journal of the Scholarship of Teaching and Learning, 15(2), 83-102.* Retrieved on April, 8, 2018 from https://files.eric.ed.gov/fulltext/EJ1059422.pdf

Blackwell, S., & Pepper, K. (2008). The effect of concept mapping on preservice teachers' reflective practices when making pedagogical decisions. *Journal of Effective Teaching, 8(2), 77-93.*

Blair, A. (2013). Democratizing the learning process: The use of Twitter in the teaching of politics and international relations. *Politics, 33(2), 135-145.*

Bodzin, A. M. & Park, J. C. (2002). Using a nonrestrictive web-based forum to promote reflective discourse with preservice science teachers. *Contemporary Issues in Technology and Teacher Education, 2(3), 267-289.*

Boeije, H. (2009). *Analysis in qualitative research*. Sage publications.

Bolton, G. (2014). *Reflective practice: Writing and professional development*. London: SAGE.

Boset, S. A. A., Asmawi, A., & Abedalaziz, N. (2017). The relationship between competency and work motivation of EFL teachers at public secondary schools in Yemen. *Arab World English Journal*

(AWEJ), 8 (4), 212- 228.

Boud, D., Keogh, R., & Walker, D. (1985). *Reflection: Turning experience into learning*. New York: Routledge.

Bowling, A. (2002). Research Methods in Health: Investigating health and health services. Open University Press, Buckingham.

Boyd, D. M., & Ellison, N. B. (2008). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication, 13, 210–230.*

Boyd, E. M., & Fales, A. W. (1983). Reflective learning: Key to learning from experience. *Journal of Humanistic Psychology, 23(2), 99 -117.*

Braun, V. and Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3 (2), 77-101.*

Buzdar M. & Ali A. (2013). Development of reflective thinking through distance teacher education programs at AIOU Pakistan. *International Review of Research in Open and Distance Learning, 14(3), 43-58.*

Calitz, M. G. (2009). *A cultural sensitive therapeutic approach to enhance emotional intelligence in primary school children.* Ph.D Thesis, Pretoria: University of South Africa. Retrieved on June, 1, 2016, from http://uir.unisa.ac.za/handle/10500/1648?show=full

Callens, J. & Elen, J (2015). Does a structured methodology support pre-service teachers more to reflect critically than an unstructured? *Reflective Practice, 16(5), 609-622.*

Calvo R, Arbiol A, & Iglesias, A. (2014). Are all chats suitable for learning purposes? A study of the required characteristics. *Procedia Computer Science, 27, 251-260.*

Can, S. (2015). Investigation of the motivation level of teachers working at state schools in relation to some variables. *International Journal of Progressive Education, 11(3), 153-161.*

Cansoy, R. (2017). Teachers' professional development: The case of WhatsApp. *Journal of Education and Learning, 6(4), 285-293.*

Chaiprasurt, C., & Esichaikul, V. (2013). Enhancing motivation in online courses with mobile communication tool support: A comparative study. *The International Review of Research in Open and Distributed Learning, 14(3), 377-401.*

Chalermnirundorn, N. (2018). Teacher Motivation: A Factor Affecting Persistency in Profession. *Veridian e-Journal International (Humanities, Social Sciences and arts), 11(4), 502-523.*

Chapman, D. W., Al-Barwani, T., Al Mawali, F., & Green, E. (2012). Ambivalent journey: Teacher career paths in Oman. *International Review of Education, 58(3), 387- 403.*

Cheetham, G. & Chivers, G. (1998). The reflective (and competent) practitioner: a model of professional competence which seeks to harmonise the reflective practitioner and competence-based approaches. *Journal of European Industrial Training, 22 (7), 267-276.*

Chireshe, R., & Shumba, A. (2011). Teaching as a profession in Zimbabwe: Are teachers facing a motivation crisis? *Journal of Social Sciences, 28(2), 113-118.*

Choy, S. C. & Oo, P. S. (2012). Reflective thinking and teaching practices: A precursor for incorporating critical thinking into the classroom. *International Journal of Instruction, 5 (1), 167-182.*

Christodoulou, N. (2013). *The impact of guided reflective practice on the teaching of English as a foreign language in higher education in Cyprus.* Ed.D thesis, University of Nottingham, UK.

Church, K., & de Oliveira, R. (2013). What's up with whatsapp? Comparing mobile instant messaging behaviors with traditional SMS. In: *Proceedings of the 15th international conference on*

human-computer interaction with mobile devices and services (pp. 352-361), Munich, Germany, 27-30 August, 2013.

Clarke, A. (1995). Professional development in practicum settings: Reflective practice under scrutiny. *Teaching & Teacher Education, 11(3), 243-261.*

Claudia, V. (2015). The role of motivation in the development of school teachers' career. *Procedia-Social and Behavioral Sciences, 180, 1109-1115.*

Coe, R. (2002). It's the Effect Size stupid: what effect size is and why it is important. In: *the annual conference of the British Educational Research Association, University of Exeter, UK, 12-14 September, 2002.*

Cohen, J. (1992a). A power primer. *Psychological Bulletin, 112, 155–159.*

Cohen, J. (1992b). Statistical power analysis. *Current directions in psychological science, 1(3), p98-101.*

Cohen, L., Manion, L. & Morrison, K. (2007). *Research methods in education, (6th ed.).* London: Routledge

Cohen, L., Mainion, L. & Morrison, K. (2011). *Research methods in education.* New York: Routledge.

Collin, S. & Karsenti, T. (2012). The role of online interaction as support for reflective practice in preservice teachers. *Teachers & Teaching, 20(2), 46-59.*

Corbin, J., & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory, (3th ed.).* Thousand Oaks, CA: Sage.

Creswell, J. W. (2014). *Research design: qualitative, quantitative, and mixed methods approaches, (4th ed.).* Thousand Oaks, California: SAGE Publications.

Creswell, J., Klassen, A., Plano Clark, V. & Smith, K. (2011). *Best practice for mixed methods research in the health sciences.* Bethesda, MD: Office of Behavioral and Social Sciences Research, National Institutes of Health.

Creswell, J. W. & Plano Clark V. L, (2011). *Designing and Conducting Mixed Methods Research, (2nd ed.).* Thousand Oaks, CA: Sage.

Creswell, J. W., & Poth, C. (2018). *Qualitative inquiry and research design: Choosing among five approaches, (4th ed.).* Los Angeles: SAGE Publications.

Cunningham, J. B., & McCrum-Gardner, E. (2007). Power, effect and sample size using G Power: practical issues for researchers and members of research ethics committees. *Evidence-Based Midwifery, 5(4), 132-137.*

da Cunha Junior, F. R., Van Oers, B., & Kontopodis, M. (2016). Collaborating on Facebook: Teachers exchanging experiences through social networking sites. *Cultural-Historical Psychology, 12(3), 290-309.*

Dadds, M. (2014). Continuing professional development: Nurturing the expert within. *Professional Development in Education, 40(1), 9-16.*

Daniels, E. (2016). Logistical factors in teachers' motivation. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 89(2), 61-66.*

Day, C. (1999). Professional development and reflective practice: purposes, processes and partnerships. *Pedagogy, Culture & Society, 7(2), 221-233.*

Day, C., Sammons, P., Stobart, G., Kington, A., & Gu, Q. (2007). *Teachers matter: Connecting work, lives and effectiveness.* UK, Berkshire: Open University Press.

Deci, E. L. & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviour.* New York: Plenum.

Derrac, J., Garcia, S., Molina, D., & Herrera, F. (2011). A practical tutorial on the use of nonparametric statistical tests as a methodology for comparing evolutionary and swarm intelligence algorithms. *Swarm and Evolutionary Computation, 1(1), 3-18.*

Dervent, F. (2015). The effect of reflective thinking on the teaching practices of preservice physical education teachers. *Issues in Educational Research, 25(3), 260-274.*

De Sevin, E. (2009). Relation between motivations and personality traits for autonomous virtual humans. *Proceedings of the 8th International Conference on Autonomous Agents and Multiagent Systems (p.1131-1132), Budapest, Hungary, 10–15 May, 2009.*

Dewey, J. (1910). *How we think.* Boston: D.C. Heath & Co.

De Vaus, D. (2002). *Analyzing social science data: 50 key problems in data analysis.* London: SAGE Publication.

De Winter, J. & Dodou, D. (2012). Five-point Likert items: t test versus Mann-Whitney-Wilcoxon. *Practical Assessment, Research & Evaluation, 15(11), 1-16.*

Dimitrov, D.M. & Rumrill, P.D. Jr. (2003). Pretest-posttest designs and measurement of change. *Work, 20, 159-165.*

Dirin, A. (2016). *From Usability to User Experience in Mobile Learning Applications.* Doctoral dissertation, Aalto University, Finland.

Doherty, M. (1994). Probability versus Non-Probability Sampling in Sample Surveys. *The New Zealand Statistics Review, 4, 21-28.* Retrieved On March, 3, 2016, from http://www.nss.gov.au/nss/home.NSF/75427d7291fa0145ca2571340022a2ad/768dd0fbbf616c71ca2571ab002470cd/%24FILE/Probability%20versus%20Non%20Probability%20Sampling.pdf.

Dornyei, Z. (1998). Motivation in second and foreign language learning. *Language teaching, 31(3), 117-135.*

Dornyei, Z. (2001). *Motivational strategies in the language classroom.* Cambridge: Cambridge University Press.

Dornyei, Z. & Ushioda, E. (2013). *Teaching and researching motivation, (2nd ed.).* New York: Routledge.

Ebner, M., Lienhardt, C., Rohs, M., & Meyer, I. (2010). Micro-blogs in higher education: A chance to facilitate informal and process-oriented learning. *Computers and Education, 55, 92-100.* Retrieved on June, 4, 2017, from https://pdfs.semanticscholar.org/297b/74e3d3039905571af00a01dfa92a28aaaf3f.pdf

Education Council (2014). *Education in the Sultanate of Oman.* Muscat: Education Council.

Ekanayake, S. Y., & Wishart, J. (2015). Integrating mobile phones into teaching and learning: A case study of teacher training through professional development workshops. *British Journal of Educational Technology, 46 (1), 173-189.*

Ellis, P.D. (2009). *Effect size equations.* Retrieved on November, 20, 2015, from http://www.polyu.edu.hk/mm/effectsizefaqs/effect_size_equations2.html.

El-Shobaky, M. (2006). Woman's work according to Islamic Regulations. *Proceedings of Islamic legislation and requirements of reality Conference, University of Ghaza, Ghaza, 13–14 March, 2006.* (Arabic version).

Evans, L. (1998). *Teacher morale, job satisfaction and motivation.* Sage.

Evans, M. B., Wei, C., & Spyridakis, J. H. (2004). Using statistical power analysis to tune-up a

research experiment: A case study. *Proceedings of IEEE International Professional Communication Conference, 2004, p.14–18.* Retrieved on January, 6, 2017, from https://www.researchgate.net/profile/Jan_Spyridakis/publication/4114714_Using_statistical_power_analysis_to_tune-up_a_research_experiment_A_case_study/links/00b7d52d17f5f4d7cb000000/Using-statistical-power-analysis-to-tune-up-a-research-experiment-A-case-study.pdf.

Faghihi, G., & Anani Sarab, M. R. (2016). Teachers as reflective practitioners: A survey on Iranian English teachers' reflective practice. *The Journal of Teaching Language Skills, 7(4), 57-86.*

Fakazli, O., & Gonen, S. I. (2017). Reflection on reflection: EFL university instructors' perceptions on reflective practices. *H. U. Journal of Education, 32(3), 708-726.*

Farr, F., & Riordan, E. (2015). Tracing the reflective practices of student teachers in online modes. *ReCALL, 27(1), 104-123.*

Farrokhyar, F., Reddy, D., Poolman, R. & Bhandari, M (2013). Practical tips for surgical research: Why perform a priori sample size calculation? *Canadian Medical Association, 56 (3), 207-213.*

Fatemipour, H. (2013). The efficiency of the tools used for reflective teaching in ESL contexts. *Procedia-Social and Behavioral Sciences, 93, 1398-1403.*

Fernet, C., Senecal, C., Guay, F., Marsh, H. & Dowson, M. (2008). The Work Tasks Motivation Scale for Teachers (WTMST). *Journal of Career Assessment, 16 (2), 256-279.*

Ferraro, J. M. (2000). *Reflective practice and professional development.* Washington, DC: Clearinghouse on Teaching and Teacher Education. (ERIC Document Reproduction Services No. ED 449 120).

Field, A. (2012). *Discovering statistics using IBM SPSS statistics.* London: SAGE Publications.

Field, A. (2000). *Discovering statistics using SPSS for windows.* London: SAGE Publications.

Field, K. (2011). Reflection at the heart of effective continuing professional development. *Professional Development in Education, 37(2), 171-175.*

Figueiredo Filho, D. B., Paranhos, R., Rocha, E. C. D., Batista, M., Silva Jr, J. A. D., Santos, M. L. W. D., & Marino, J. G. (2013). When is statistical significance not significant? *Brazilian Political Science Review, 7(1), 31-55.*

Finlay, L. (2008). Reflecting on reflective practice. *Practice-based Professional Learning Centre, 52.* Retrieved on June, 20, 2016, from https://www.open.ac.uk/opencetl/sites/www.open.ac.uk.opencetl/files/files/ecms/web-content/Finlay-(2008)-Reflecting-on-reflective-practice-PBPL-paper-52.pdf

Firestone, W., & Pennell, J. (1993). Teacher commitment, working conditions, and differential incentive policies. *Review of Educational Research, 63(4), 489-525.*

Flick, U. (2014). *An introduction to qualitative research.* Sage.

Flick, U., von Kardoff, E., & Steinke, I. (Eds.). (2004). *A companion to qualitative research.* Sage.

Gagne, M., Forest, J., Vansteenkiste, M., Crevier-Braud, L., Van den Broeck, A., Aspeli, A. K., Bellerose, J., Benabou, C., Chemolli, E., Guntert, S. T., Halvari, H., Indiyastuti, D. L., Johnson, P. A., Molstad, M. H., Naudin, M., Ndao, A., Olafsen, A. H., Roussel, P., Wang, Z., & Westbye, C. (2015). The Multidimensional Work Motivation Scale: Validation evidence in seven languages and nine countries. *European Journal of Work and Organizational Psychology, 24(2), 178-196.*

Gelter, H. (2003). Why is reflective thinking uncommon? *Reflective practice, 4(3), 337-344.*

Ghasemi, A. & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism, 10(2), 486-489.*

Ghaye, T. (2011). *Teaching and learning through reflective practice: A practical guide for positive action (2nd ed.).* UK, Abingdon: Routledge.

Gibbs, G. R. (2008). *Analysing qualitative data.* Sage.

Gibbs, G. (2002). *Qualitative data analysis: Explorations with NVivo.* London: Open University Press.

Gillham, B. (2000).*The research interview.* London: Continuum

Goodman, J. (1984). Reflection and teacher education: a case study and theoretical analysis. *Interchange, 15(3), 9-26.*

Gorozidis, G., & Papaioannou, A. G. (2014). Teachers' motivation to participate in training and to implement innovations. *Teaching and Teacher Education, 39, 1-11.*

Grosseck, G., & Holotescu, C. (2008). Can we use Twitter for educational activities? *In the 4th International Scientific Conference eLSE: eLearning and Software for Education, Bucharest, Romania, 17-18 April, 2008.* Retrieved on December, 5, 2017, from http://portaldoprofessor.mec.gov.br/storage/materiais/0000012008.pdf

GSMA Intelligence, (2018). *The mobile economy.* Retrieved on May, 2018, from https://www.gsma.com/mobileeconomy/wp-content/uploads/2018/02/The-Mobile-Economy-Global-2018.pdf.

Gu, Q., Heesom, S., Williamson, R., & Crowther, K. (2018). *Reducing teachers' unnecessary workload: the promise of collaborative planning.* UK, London: Transform Trust and Teaching School Alliance.

Guajardo, J. (2011). *Teacher motivation: Theoretical framework, situation analysis of Save the Children country offices, and recommended strategies.* Save the Children Basic Education Intern.

Guay, F., Chanal, J., Ratelle, C. F., Marsh, H. W., Larose, S., & Boivin, M. (2010). Intrinsic, identified, and controlled types of motivation for school subjects in young elementary school children. *British Journal of Educational Psychology, 80(4), 711-735.*

Guest, G., Namey, E. & Mitchell, M. (2013). *Collecting qualitative data: A Field Manual for Applied Research.* London: SAGE Publications.

Gungor, M. N. (2016). Turkish pre-service teachers' reflective practices in teaching English to young learners. *Australian Journal of Teacher Education, 41(2), 137-151.*

Guskey, T. R. (2000). *Evaluating professional development.* Thousand Oaks, CA: Corwin Press.

Hamat, A., Embi, M.A., Hassan, H.A., (2012). The use of social networking sites among Malaysian university students. *International Education Studies, 5 (3), 56–66.*

Hall, T. J., & Smith, M. A. (2006). Teacher Planning, Instruction and Reflection: What We Know About Teacher Cognitive Processes. *Quest, 58(4), 424-442.*

Hameedsha, N. (2012). Interview in social research. *Journal of Humanities and Social Sciences, (8), 96-109.*

Han, E. P. (1995). Issues in education: Reflection is essential in teacher education. *Childhood Education, 71(4), 228-231.*

Han, T., & Mahzoun, Z. (2017). What demotivates foreign EFL teachers? A case study in Turkish context. *The Qualitative Report, 22(4), 1001-1014.*

Hancock B., Windridge K., & Ockleford E. (2007). *An introduction to qualitative research.* UK: The NIHR RDS EM / YH.

Hapsari, W. (2013). Teacher's perceived characteristics and preferences of motivational strategies in

the language classroom. *Teflin Journal, 24(2), 113-134.*

Harrington, H. L., & Hathaway, R. S. (1994). Computer conferencing, critical reflection, and teacher development. *Teaching and Teacher Education, 10(5), 543–554.*

Hashemi, M., Azizinezhad, M., Najafi, V., & Nesari, A. J. (2011). What is mobile learning? Challenges and capabilities. *Procedia-Social and Behavioral Sciences, 30, 2477-2481.*

Hattie, J. (2009). *Visible learning: a synthesis of over 800 meta-analyses relating to achievement.* New York: Rutledge.

Hatton, N., & Smith, D. (1995). Reflection in teacher education: towards definition and implementation. *Teaching and Teacher Education, 11(1), 33-49.*

Hazzi, O. A., & Maldaon, I. S. (2015). A pilot study: Vital methodological issues. *Business: Theory and Practice, 16(1), 53-62.*

Healey, M., & Jenkins, A. (2000). Kolb's experiential learning theory and its application in geography in higher education. *Journal of geography, 99(5), 185-195.*

Hein, V., Ries, F., Pires, F., Caune, A., Ekler, J. H., Emeljanovas, A., & Valantiniene, I. (2012). The relationship between teaching styles and motivation to teach among physical education teachers. *Journal of sports science & medicine, 11(1), 123-130.*

Hesse-Biber, S. & Leavy, P. (2011). *The practice of qualitative research.* USA: SAGE.

Heystek, J., & Terhoven, R. (2014). Motivation as critical factor for teacher development in contextually challenging underperforming schools in South Africa. *Professional Development in Education, 41(4), 624–639.*

Hildebrandt, S. A., & Eom, M. (2011). Teacher professionalization: Motivational factors and the influence of age. *Teaching and Teacher Education, 27(2), 416-423.*

Hill, R. (1998). What sample size is "enough" in internet survey research? *Interpersonal Computing and Technology: An Electronic Journal for the 21st Century, 6(3-4), 1-10.* Retrieved November, 21, 2016 from http://www.reconstrue.co.nz/IPCT-J%20Vol%206%20Robin%20hill%20SampleSize.pdf

Hintze, J. L. (2011). *User's Guide III.* US, Utah: NCSS. Retrieved from https://ncss-wpengine.netdna-ssl.com/wp-content/uploads/2012/09/PASS11UG3.pdf

Hiver, P., Kim, T. Y., & Kim, Y. (2018). Language teacher motivation. In Mercer, S. & Kostoulas, A. (Eds.), *Language Teacher Psychology (p. 18–33).* Bristol, UK: Multilingual Matters.

Hollyforde, S., & Whiddett, S. (2002). *The motivation handbook.* London: CIPD Publishing.

Howitt, D. & Cramer, D. (2014). *Introduction to statistics in psychology, (6th ed.).* UK: Person.

Hung, H. (2008). Teacher learning: Reflective practice as a site of engagement for professional identity construction. *U.S.-China Education Review, 5(5), 39-49.*

Impedovo, M. A., & Malik, S. K. (2016). Becoming a reflective in-Service teacher: Role of research attitude. *Australian Journal of Teacher Education, 41(1), 99-112.*

Imran, R., Allil, K. & Mahmoud, A. (2017). Teacher's turnover intentions: Examining the impact of motivation and organizational commitment. *International Journal of Educational Management, 31(6), 828-842.*

Imtinan, u., Chang, V., and Issa, T. (2013). *Common mobile learning characteristic - An analysis of mobile learning models and frameworks.* Australia, Perth: School of Information Systems, Curtin University. Retrieved December, 4, 2017, from: https://files.eric.ed.gov/fulltext/ED562404.pdf

Inayatullah, A., & Jehangir, P. (2012). Teachers' job performance: The role of motivation. *Abasyn Journal of Social Sciences, 5(2), 78–99.*

International Telecommunication Union, (2017). *Measuring the information society report.* Retrieved on Junuary, 4, 2018, from https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume2.pdf.

Internet World Stats (2017). *Internet usage in the Middle East.* Retrieved February, 16, 2018, from https://www.internetworldstats.com/stats5.htm.

Ismail, A., & Abd Razak, M. R. (2016). A study on job satisfaction as a determinant of job motivation. *Acta Universitatis Danubius, 12(3), 30-44.*

Jaeger, R. M. (1984). *Sampling in education and the social sciences.* New York: Longman.

Jakobsson, U. (2004). Statistical presentation and analysis of ordinal data in nursing research. *Scandinavian journal of caring sciences, 18(4), 437-440.*

Jay, J. K., & Johnson, K. L. (2002). Capturing complexity: A typology of reflective practice for teacher education. *Teaching and teacher education, 18(1), 73-85.*

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of mixed methods research, 1(2), 112-133.*

Joyce, B. & Showers, B. (1980). Improving in-service training: the messages of research. *Educational Leadership, 37, 379-385.*

Judge, T. A., & Ilies, R. (2002). Relationship of personality to performance motivation: A meta-analytic review. *Journal of applied psychology, 87(4), 797-807.*

Junco, R., Cotten, S.R., (2012). No A 4 U: The relationship between multitasking and academic performance. *Computers & Educucation, 59 (2), 505-514.*

Kajornboon, A. B. (2013). The effect of using social networking assisted interaction between peer and teacher in English language learning. *Proceedings of FLLT Conference, Bangkok, Thailand, March 15-16, 2013.* Retrieved from http://www.litu.tu.ac.th/journal/FLLTCP/Proceeding/611.pdf

Kaplan, A., & Maehr, M. L. (2007). The contributions and prospects of goal orientation theory. *Educational Psychology Review, 19(2), 141-184.*

Karabenick, S. A., & Conley, A. (2011).*Teacher Motivation for Professional Development.* Math and Science Partnership - Motivation Assessment Programme, University of Michigan, Ann Arbor, MI 48109.

Kawulich, B. B. (2005). Participant observation as a data collection method. *Qualitative Social Research, 6(2), Article 43.*

Kayapinar, U. & Erkus, A. (2009). Measuring teacher reflection: development of TRS. *Egitim Arastirmalari-Eurasian Journal of Educational Research, 37,144-158.*

Kember, D., Leung, D., Jones, A., Loke, A., McKay, J., Sinclair, K., Tse, H., Webb, C., Yuet Wong, F., Wong, M. & Yeung, E. (2000). Development of a questionnaire to measure the level of reflective thinking. *Assessment & Evaluation in Higher Education, 25(4), 381-395.*

Kempf, A. (2014). Making Time for Reflection: One Teacher's Quest Toward Deeper Student Understanding. *The Reading Teacher, 67(7), 527-527.*

Keshavarzi, S., & Fumani, M. (2015). The impact of Teachers' Reflectivity and Gender on their intelluctual Excitement and Interpersonal Teaching Style. *Theory and Practice in Language studies, 5(3), 525-534.*

Kilis, S. (2013). Impacts of mobile learning in motivation, engagement and achievement of learners: Review of literature. *Gaziantep University Journal of Social Sciences, 12(2), 375-383.*

Killion, J., Joellen, P., Todnem, & Guy, R. (1991). A process for personal theory building.

Educational Leadership, 48(6), p. 14-16.

Kim, H., & Cho, Y. (2014). Pre-service teachers' motivation, sense of teaching efficacy, and expectation of reality shock. *Asia-Pacific Journal of Teacher Education 42(1), 67-81.*

Kim, C., & Keller, J. M. (2011). Towards technology integration: The impact of motivational and volitional email messages. *Educational Technology Research and Development, 59(1), 91-111.*

Kirk, R. (2000). A study of the use of a private chat room to increase reflective thinking in pre-service teachers. *College Student Journal, 34, 115-122.*

Kheirzadeh, S., & Sistani, N. (2018). The effect of reflective teaching on Iranian EFL students' achievement: The case of teaching experience and level of education. *Australian Journal of Teacher Education, 43(2), 143-156.*

Klassen, R. M., Al-Dhafri, S., Hannok, W., & Betts, S. M. (2011). Investigating pre-service teacher motivation across cultures using the Teachers' Ten Statements Test. *Teaching and Teacher Education, 27(3), 579-588.*

Klopfer, Squire, K., & Jenkins, H. (2002). Environmental Detectives: PDAs as a window into a virtual simulated world. *Proceedings of IEEE International Workshop on Wireless and Mobile Technologies in Education, Vaxjo, Sweden: IEEE Computer Society, p. 95-98.* Retrieved on April, 22, 2017, from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.457.5222&rep=rep1&type=pdf.

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. New Jersey: Prentice-Hall.

Kolb, A. Y., & Kolb, D. A. (2008). Experiential learning theory: A dynamic holistic approach to management learning, education and development. In Armstrong, S. J. & Fukami, C. (Eds.). *Handbook of management learning education and development (p. 42-68).* London, UK: SAGE.

Kosovich, J. J., Hulleman, C. S., Barron, K. E., & Getty, S. (2015). A Practical measure of student motivation : Establishing validity evidence for the scale in middle school. *Journal of Early Adolescence, 35(5-6), 790-816.*

Kothari, C. R. (2004). *Research methodology: Methods & techniques.* New Delhi: New Age International.

Kremelberg, D. (2011). *Practical Statistics, a quick and easy guide to IBM SPSS Statistics, STATA, and other Statistical Software.* California, USA: SAGE Publications.

Kubanyiova, M. (2007). *Teacher development in action: an empirically-based model of promoting conceptual change in in-service language teachers in Slovakia.* PhD thesis, University of Nottingham, UK.

Kukulska-Hulme, A. (2009). Will mobile learning change language learning? *European Association for Computer Assisted Language Learning, 21(2), 157-165.* Retrieved on June, 2, 2017, from https://pdfs.semanticscholar.org/be87/e4467304a0144d884404fa3a9d4bf9c631c4.pdf

Kukulsak-Hulme, A. & Traxler, J. (2005). *Mobile Learning: A handbook for educators and trainers.* London: Rouledge

Kukulska-Hulme, A., Evans, D. & Traxler, J. (2005). Landscape study on the use of mobile and wireless technologies for teaching and learning in the post-16 sector. *JISC-funded project.* Retrieved on April, 20, 2017, from: http://oro.open.ac.uk/43927/2/Landscape%20study%202005_all%20reports.pdf

Kustijono, R., & Zuhri, F. (2018). The use of Facebook and WhatsApp application in learning process of physics to train students' critical thinking skills. *IOP Conference Series: Materials Science and Engineering, 296, 1-7.* Retrieved from http://iopscience.iop.org/article/10.1088/1757-

899X/296/1/012025/pdf

Kvale, S. & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing, (2nd ed.).* CA: Sage.

Kyriacou, C. & Coulthard, M. (2000). Undergraduates views of teaching as a career choice. *Journal of Education for Teaching, 26(2), 117–26.*

Lan, Y. F., & Sie, Y. S. (2010). Using RSS to support mobile learning based on media richness theory. *Computers & Education, 55(2), 723-732.*

Larrivee, B. (2008). Development of a tool to assess teachers' level of reflective practice. *Reflective practice, 9(3), 341-360.*

Len-Kibinkiri, E. (2014). Mobile-learning potential effects on teachers' initial professional development in Cameroon: Curriculum perspective. *Creative Education, 5, 1170-1180.*

Liakopoulou, M. (2012). The role of field experience in the preparation of reflective teachers. *Australian Journal of Teacher Education, 37(6), 42-54.*

Ling, R. & Donner, J. (2009). *Mobile communication*. Cambridge, UK: Polity press.

Lohr, S. (2009). *Sampling: design and analysis.* Boston, UAS: Brooks/Cole.

Lubis, A. (2017). Teaching Reflection: A Voice from Indonesian EFL Teachers. *International Journal of English Language Teaching and Linguistics, 2(1), 29-39.*

Lumanisa, A. (2015). *The Influence of Personality Traits and Motivational Factors in Predicting Students Academic Achievement.* Doctoral dissertation, National College of Ireland, Dublin.

Lupinski, K., Jenkins, P., Beard, A., & Jones, L. (2012). Reflective practice in teacher education programs at a HBCU. *The Journal of Educational Foundations, 26(3-4), 81-92.*

Malone, T.W., & Lepper, M. R. (1987). Making learning fun: A taxonomy of intrinsic motivations for learning. In Snow, R.E. & Farr, M.J., (Eds.), *Aptitude, Learning & Instruction III: Conative and Affective Process Analyses, p. 223– 253.* Hillsdale, NJ: Erlbaum.

Mann, K., Gordon, J., & Macleod, A. (2009). Reflection and reflective practice in health professions education . *Adv in Health SciEduc, 14, 595–621.*

Marques de sa, J. P., (2007). *Applied statistics using SPSS, STATISTICA, MATLAB and R*. Berlin: Spring.

Mathew, P., Mathew, P., & Peechattu, P. (2017). Reflective Practices: A means to teacher development. *Asia Pacific Journal of Contemporary Education and Communication Technology, 3(1), 126-131.*

Masue, O. S., Swai, I. L., & Anasel, M. G. (2013). The Qualitative-quantitative 'disparities' in social science research: What does qualitative comparative analysis (QCA) brings in to bridge the gap? *Asian Social Science, 9(10), 211-221.*

McConnell, T. J., Lundeberg, M. A., Koehler, M. J., Urban-Lurain, M., Zhang, T., Mikeska, J., & Eberhardt, J. (2008). Video-based teacher reflection–What is the real effect on reflections of in-service teachers. *Proceedings of International Conference of the Association of Science Teachers Educators, Saint Louis, MO., January 12, 2008.*

McCrum-Gardner, E. (2010). Sample size and power calculations made simple. *International Journal of Therapy and Rehabilitation, 17(1), 10-14.*

McFadden, J., Ellis, J., Anwar, T., & Roehrig, G. (2014). Beginning science teachers' use of a digital video annotation tool to promote reflective practices. *Journal of Science Education and Technology, 23(3), 458-470.*

McKimm, J (2004). *Developing yourself as a leader; reflecting about yourself as a leader.* FDTL Leadership programme, York: The Higher Education Academy. Retrieved December, 4, 2017, from http://www.itslifejimbutnotasweknowit.org.uk/files/Kolbetc.pdf

McKinney, P. (2000). *A study to assess the relationships among student achievement, teacher motivation, and incentive pay.* Doctor of Education, Virginia Polytechnic Institute and State University, Blacksburg.

McNamara, D. (1990). Research on teachers' thinking: Its contribution to educating student teachers to think critically. *Journal of Education for Teaching, 16(2), 147-160.*

Mehdipour, Y., & Zerehkafi, H. (2013). Mobile learning for education: Benefits and challenges. *International Journal of Computational Engineering Research, 3(6), 93-101.*

Merriam, S. (2009). *Qualitative research: A guide to design and implementation.* San Francisco, CA: Jossey-Bass.

Ministry of education (2016). *Educational indicators, issue 17.* Muscat: Ministry of Education.

Ministry of Education (2008). *Inclusive education in the Sultanate of Oman: National report of the Sultanate of Oman.* Muscat: Ministry of Education.

Ministry of Education (2005). *Guide of Educational Supervision.* Muscat: Ministry of Education. Retrieved January, 4, 2016, from https://www.slideshare.net/salem2555/ss-5464032 (Arabic Version).

Ministry of Education. (2004). *National report on quality education in Oman.* Muscat: Ministry of Education.

Ministry of Education (2018). *The annual educational statistics book, 2017/2018, issue 48.* Muscat: Ministry of Education.

Ministry of Education (2016). *The specialised centre for professional training of teachers, guide 2016.* Muscat: Ministry of Education. Retrieved November, 07, 2018, from http://havasapps.com/test/moe/ar/

Ministry of education and the World Bank (2012). *Education in Oman, the drive for quality.* Muscat: Ministry of Education.

Minott, M. A. (2010). Reflective teaching and how it aids in coping with heavy workloads, mandated policies and disagreements with colleagues. *Current Issues in Education, 13(1), 1-29.*

Minott, M. A. (2011). The impact of a course in reflective teaching on student teachers at a local university college. *Canadian Journal of Education, 34(2), 131-147.*

Mircioiu, C. & Atkinson, J. (2017). A comparison of parametric and non-parametric methods applied to a Likert scale. *Pharmacy, 26(5), 1-12.*

Mohammadi, H. (2015). Computers in Human Behavior Social and individual antecedents of m-learning adoption in Iran. *Computers in Human Behavior, 49, 191-207.*

Moon, J. A. (2013). *Reflection in learning and professional development: Theory and practice.* New York: Routledge Falmer

Moradkhani, S., Raygan, A., & Moein, M. S. (2017). Iranian EFL teachers' reflective practices and self-efficacy: Exploring possible relationships. *System, 65, 1-14.*

Mork, C. (2009). Using Twitter in EFL education. *The jalt call Journal, 5(3), 41-56.*

Motallebzadeh, K., Ahmadi, F., & Hosseinnia, M. (2018). The relationship between EFL teachers' reflective practices and their teaching effectiveness: A structural equation modelling approach. *Cogent Psychology, 5(1), 1-9.*

Motiwalla, L. F. (2007). Mobile learning: a framework and evaluation. *Computers & Education,*

49(3), 581-596.

Muller, K., Alliata, R. & Benninghoff, F. (2009). Attracting and Retaining Teachers: A question of Motivation. *Educational Management Administration & Leadership, 37(5), 574-599.*

Mumby, P. (2002). Statistical power of non-parametric tests: A quick guide for designing sampling strategies. *Marine Pollution Bulletin, 44, 85-87.*

Murphy, D. & Ermeling, B. (2016). Feedback on reflection: comparing rating-scale and forced-choice formats for measuring and facilitating teacher team reflective practice. *Reflective Practice, 17(3), 317-333.*

Murphy, J., Link, M. W., Childs, J. H., Tesfaye, C. L., Dean, E., Stern, M., Pasek, J., Cohen, J., Callegaro, M., Harwood, P., (2014). Social media in public opinion research: Executive summary of the Aapor task force on emerging technologies in public opinion research. *Public Opinion Quarterly, 78(4), 788-794.*

Nachar, N. (2008). The Mann-Whitney U: A test for assessing whether two independent samples come from the same distribution. *Tutorials in Quantitative Methods for Psychology, 4(1), 13-20.*

Nambiar, R. M., & Thang, S. M. (2016). Examining Malaysian teachers' online blogs for reflective practices: Towards teacher professional development. *Language and Education, 30(1), 43-57.*

Naseer UdDin, M., Tufail, H., Shereen, S., Nawaz, A., & Shahbaz, A. (2012). Factor affecting teacher motivation at secondary school level in Kohat City. *Interdisciplinary Journal of Contemporary Research in Business, 3(10), 442-449.*

National for Centre Statistics & Information (2018). The Population Watch. Retrieved on November, 25, 2018, from https://www.ncsi.gov.om/Pages/NCSI.aspx.

Nestor, P. G., & Schutt, R. K. (2012). *Research methods in psychology: Investigating human behavior.* Sage Publications.

Neville, H., Smith, D., (1995). Reflection in teacher education: Towards definition and implementation. *Teaching and Teacher Education 11(1), 33–49.*

Newman, I., & Benz, C. R. (1998). *Qualitative-quantitative research methodology: Exploring the interactive continuum.* Carbondale, IL: Southern Illinois University Press.

Noordzij, M., Tripepi, G., Dekker, F. W., Zoccali, C., Tanck, M. W., & Jager, K. J. (2010). Sample size calculations: Basic principles and common pitfalls. *Nephrology dialysis transplantation, 25(5), 1388-1393.*

Oates, J, Kwiatkowski, R & Coulthard, L (2010).*Code of human research ethics.* Leicester, UK: The British Psychological Society.

Obiefuna, C. A., & Offorma, G. C. (2014). Pre service teachers' perception of using mobile devices in teaching climate change in primary schools. *International Journal on Integrating Technology in Education (IJITE), 3(2), 39-50.*

Olasina, G. (2012). Student's e-learning/m-learning experiences and impact on motivation in Nigeria. *Proceedings of the 33rd Annual International Association of Scientific and Technological University Libraries (IATUL) Conferences, Singapore, June 4-7, 2012.* Retrieved May, 7, 2018 from https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1121&context=iatul

Oman Population (2018). Retrieved July, 14, 2018, from http://worldpopulationreview.com/countries/oman-population/

Orjuela, A. & Delgadillo, L (2014). *A mirror reflecting teaching practices.* Master thesis, University Free of Colombia, Bogota D.C.

Ozdamli, F. & Cavus, N. (2011). Basic elements and characteristics of mobile learning. *Procedia - Social and Behavioral Sciences, 28, 937-942.*

Pacheco, A. Q. (2005). Reflective teaching and its impact on foreign language teaching. *Revista Electronica, 5, 1-19.*

Pandey, S. R. (2012). Reflective practice: A gateway to professional development. *Journal of NELTA, 17(1-2), 40-49.*

Park, M. & So, K. (2014). Opportunities and challenges for teacher professional development: A case of collaborative learning community in South Korea. *International Education Studies, 7(7), 96-108.*

Parkes, K.A, Dredger, K.S., & Hicks, D. (2013). ePortfolio as a measure of reflective practice. *International Journal of ePortfolio, 3 (2), 99-115.*

Peters, K. (2007). M-Learning: Positioning educators for a mobile, connected future. *International Review of Research in Open and Distance Learning, 8(2), 1-17.* Retrieved May, 26, 2018 from: https://files.eric.ed.gov/fulltext/EJ800956.pdf

Pintrich, P. &Schunk, D., (2002). *Motivation in education: Theory, research and applications.* New Jersey, USA: Merrill.

Polit, D.F. & Beck, C.T. (1985). *Essentials of Nursing Research: Appraising Evidence for Nursing Practice, (7th ed.).* Philadelphia: Lippincott Williams & Wilkins.

Porta, M. (Ed.). (2006). *A dictionary of epidemiology.* New York: Oxford University Press.

Price, F., & Kadi-Hanifi, K. (2011). E-Motivation! The role of popular technology in student motivation and retention. *Research in Post-Compulsory Education, 16(2), 173-187.*

Queiros, A., Faria, D. & Almeida, F. (2017). Strengths and limitations of qualitative and quantitative research methods. *European Journal of Education Studies, 3(9), 369-387.*

Rau, P. L., Gao, Q., & Wu, L. M. (2008). Using mobile communication technology in high school education: Motivation, pressure, and learning performance. *Computers & Education, 50(1), 1-22.*

Ray, B. B., & Hocutt, M. M. (2006). Teacher-created, teacher-centered weblogs: Perceptions and practices. *Journal of Computing in Teacher Education, 23(1), 11-18.*

Read, T. &Kukulska-Hulme, A. (2015). The role of a mobile app for listening comprehension training in distance learning to sustain student motivation. *Journal of Universal Computer Science, 21(10), 1327-1338.*

Recepoglu, E. (2014). Analyzing job motivation level of high school teachers in Turkey. *Procedia-Social and Behavioral Sciences, 116, 2220-2225.*

Reed, Y., Davis, H., & Nyabanyaba, T. (2002). Investigating teachers' take-up of reflective practice from an in-service professional development teacher education programme in South Africa. *Educational Action Research, 10(2), 253-274.*

Reeve, J. M. (2005). *Understanding motivation and emotion, (4th ed.).* Hoboken: John Wiley & Sons.

Reid, B., (1993). 'But we're doing it already!' Exploring a response to the concept of reflective practice in order to improve its facilitation. *Nurse Education Today, (13), 305-309.*

Renandya, A. W. (2015). L2 motivation: Whose responsibility is it? *English Language Teaching, 27(4), 177-189.*

Reynolds, M. (2011). Reflective practice: Origins and interpretations. *Action Learning, Research and Practice, 8 (1), 5-13.*

Rezaeyan, M. & Nikoopour, J. (2013).The relationship between reflectivity of foreign language

teachers with Iranian students' achievement. *Journal of Language Sciences & Linguistics, 1(1), 9-20.*

Rice, J. K. (2010). The impact of teacher experience: Examining the evidence and policy implications. *National Center for Analysis of Longitudinal Data in Education Research*, 1-8.

Richards, J. C. (1998). *Beyond training: Perspectives on language teacher education.* New York: Cambridge University Press.

Richardson, P. W., Karabenick, S. A., & Watt, H. M. (2014). *Teacher motivation: Theory and practice.* New York: Routledge.

Rivera, J.E. and S.L. Dann. (2011). Encouraging critical reflection through action research projects in agriculture and natural resources teacher preparation: A case study. *NACTA Journal, 55(4), 82-90.*

Rodgers, C. (2002). Defining reflection: Another look at John Dewey and reflective thinking. *Teachers College Record, 104(4), 842-866.*

Rodriguez, S. (2008). Teachers' attitudes towards reflective teaching: Evidences in a professional development programme (PDP). *Profile Issues in Teachers' Professional Development, (10), 91-112.*

Rogers, R. R. (2001). Reflection in higher education: A concept analysis. *Innovative Higher Education, 26(1), 37-57.*

Ross, D.D. (1990). Programmatic structures for the preparation of reflective teachers. In Clift, R.T., Houston, W.R. & Pugach, M.C. (Eds.). *Encouraging reflective practice in education: An analysis of issues and programs (pp. 97–118).* New York: Teachers College Press.

Ross, J. (2011). *Unmasking online reflective practices in higher education.* PhD thesis, University of Edinburgh, UK.

Russo, T. C., & Ford, D. J. (2006). Teachers' reflection on reflection practice. *Journal of Cognitive Affective Learning, 2(2), 1-12.*

Ryan, R. M., & Deci, F. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55, 68- 78.*

Ryan, R. M., Lynch, M. F., Vansteenkiste, M., & Deci, E. L. (2011). Motivation and autonomy in counseling, psychotherapy, and behavior change: A look at theory and practice. *The Counseling Psychologist, 39(2), 193-260.*

Safarie, M., & Tarlani-aliabadi, H. (2014). Who practices what? A correlational study of personality type and teaching reflection. *Procedia-Social and Behavioral Sciences, 98, 1606-1610.*

Salinas-Grandy, C. (2016). *An analysis of reflective thinking in teacher candidates' eportfolios. Unpublished Doctoral Dissertation.* University of Nevada, Las Vegas.

Saric, M., & Steh, B. (2017). Critical reflection in the professional development of teachers: Challenges and possibilities. *Center for Educational Policy Studies Journal, 7(3), 67-85.*

Sarrab, M., Elgamel, L., & Aldabbas, H., (2012). Mobile learning (M-Learning) and educational environments. *International Journal of Distributed and Parallel Systems, 3(4), 31-38.*

Sathian, B., Sreedharan, J., Baboo, S. N., Sharan, K., Abhilash, E. S., & Rajesh, E. (2010). Relevance of sample size determination in medical research. *Nepal Journal of Epidemiology, 1(1), 4-10.*

Savolainen, R. (2012). Expectancy-value beliefs and information needs as motivators for task-based information seeking. *Journal of Documentation, 68(4), 492-522.*

Scarino, A. and Liddicoat, A. (2009). *Teaching and Learning Languages: A Guide.* Department of Education, Employment and Workplace Relations, Australia. Retrieved December, 20, 2017, from http://www.tllg.unisa.edu.au/lib_guide/gllt.pdf.

Seebaluck, A. & Seegum, T. (2013). Motivation among public primary school teachers in

Mauritius. *International journal of educational management, 27(4), 446-464.*

Selemani-Meke, E. (2013). Teacher motivation and implementation of continuing professional development programmes in Malawi. *The Anthropologist, 15(1), 107-115.*

Senko, C., Hulleman, C. S., & Harackiewicz, J. M. (2011). Achievement goal theory at the crossroads: Old controversies, current challenges, and new directions. *Educational Psychologist, 46(1), 26-47.*

Serrano, J., & Yambao, Y. (2015). Social media as a venue for online class collaboration. *ASEAN Journal of Open Distance Learning, 7(2), 17-26.*

Simon, M. K. (2011). *Dissertation and scholarly research: Recipes for success (2011 Ed.).* Seattle, WA, Dissertation Success, LLC.

Sirivedin, P., Soopunyo, W., Srisuantang, S., & Wongsothorn, A. (2018). Effects of Facebook usage on English learning behavior of Thai English teachers. *Kasetsart Journal of Social Sciences, 1-7.*

Shandomo, H. M. (2010). The role of critical reflection in teacher education. *School-University Partnerships, 4(1), 101-113.*

Shank, G. D. (2002). *Qualitative research: A personal skills approach.* Ohio: Merrill Prentice Hall.

Sharples, M. (2006). *Big issues in mobile learning: Report of a workshop by the Kaleidoscope Network of Excellence Mobile Learning Initiative.* Nottingham, UK: University of Nottingham.

Sharples, M., Taylor, J. & Vavoula, G. (2007). A theory of learning for the mobile age. In Andrews, R., & Haythornthwaite, C. (Eds.), *The Sage handbook of e-learning research.* London: Sage.

Sobral, D. T. (2004). What kind of motivation drives medical students learning quests? *Med Education, 38, 950–957.*

Song, Y. (2011). Investigating undergraduate student mobile device use in context. In Kitchenham, A. (Ed.). *Models for interdisciplinary mobile learning: Delivering information to students (120-136).* Hershey, US & London, UK: IGI Global for publication.

Statista, (2018, a). *The Statistics Portal.* Retrieved August, 11, 2018, from https://www.statista.com/statistics/274774/forecast-of-mobile-phone-users-worldwide/

Statista, (2018, b). *The Statistics Portal: Number of monthly active Facebook users worldwide as of 1st quarter 2018 (in millions).* Retrieved August, 17, 2018, from https://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide/

Statista, (2018, c). *The Statistics Portal: Number of monthly active Twitter users worldwide from 1st quarter 2010 to 1st quarter 2018 (in millions).* Retrieved August, 11, 2018, from https://www.statista.com/statistics/282087/number-of-monthly-active-twitter-users/

Stipek, D. (1998). *Motivation to learn: From theory to practice (3rd ed.).* Needham Heights, Massachusetts: Allyn & Bacon.

Sturkie, L. M. (2017). *The impact of a reflective practice series on the awareness level of six teacher candidates at a public university in the Southeast.* Doctoral dissertation, University of South Carolina, US.

Suliswaro, D., & Suryani, F. (2014). The effect of cooperative learning, motivation and information technology literacy to achievement. *International Journal of Learning and Development, 4(2), 58-64.*

Sun, H., Ding. H., & Chen, A. (2014). Nothing but being there matters : Expectancy- Value motivation between U .S .and Chinese middle school students. *International Education, 42(2), 7-20.*

Sung, Y., Chang, K. and Liu, T. (2016). The effects of integrating mobile device with teaching and learning on students' learning performance: a meta-analysis and research synthesis. *Computer &*

Education, 94, 252–275.

Sweet, S. N., Fortier, M. S., Strachan, S. M., & Blanchard, C. M. (2012).Testing and integrating Self-Determination Theory and Self-Efficacy Theory in a physical activity context. *Canadian Psychology, 53(4), 319 -327.*

Syed, K.T. (2008). Misconceptions About Human Rights and Women's Rights in Islam. *Interchange 39(2), 245–257.*

Tauer, J.M. & Harackiewicz, J.M. (2004). The effects of cooperation and competition on intrinsic motivation and performance. *Journal of Personality and Social Psychology, 86, 849-861.*

Tavil, Z. M. (2014). The effect of self reflections through electronic journals (e-journals) on the self efficacy of pre-service teachers. *South African Journal of Education, 34(1), 1-20.*

Tekin, A. K. (2016). Autonomous motivation of Omani early childhood pre-service teachers for teaching. *Early Child Development and Care, 186(7), 1096-1109.*

Terras, M. M., & Ramsay, J. (2012). The five central psychological challenges facing effective mobile learning. *British Journal of Educational Technology, 43(5), 820–832.*

The Ministry of Education & the World Bank (2012). *Education in Oman: The Drive for Quality.* Muscat: Ministry of Education.

The New Zealand Education Consortium and the Ministry of Education (2017). *Evaluation of the Sultanate of Oman Education System (Grades 1-12).* Muscat: Ministry Of Education.

The United Nations Educational, Scientific and Cultural Organization (2012). *Mobile learning for teachers: Global Themes.* Paris, France: UNESCO.

The United Nations Educational, Scientific and Cultural Organization (2017). *Supporting teachers with mobile technology: Lessons drawn from UNESCO projects in Mexico, Nigeria, Pakistan and Senegal.* Paris, France: UNESCO.

The World Bank (2017). *Mobile cellular subscriptions.* Retrieved November, 29, 2018, from https://data.worldbank.org/indicator/IT.CEL.SETS.

Thoonen, E. E., Sleegers, P. J., Oort, F. J., Peetsma, T. T., & Geijsel, F. P. (2011). How to improve teaching practices: The role of teacher motivation, organizational factors, and leadership practices. *Educational administration quarterly, 47(3), 496-536.*

Timperley, H., Wilson, A., Barrar, H. & Fung, I. (2007). *Teacher professional learning and development: Best evidence synthesis iteration.* Wellington, New Zealand: Ministry of Education.

Tombak, B. & Altun, S. (2016). The effect of cooperative learning: University example. *Eurasian Journal of Educational Research, 64, 173-196.*

Tsangaridou, N., & Siedentop, D. (1995). Reflective teaching-A literature-review. *Quest, 47, 212-237.*

United Nations Development Programme (2010). *Human development report 2010, the real wealth of nations: Pathways to human development.* New York: United Nations Development Programme (UNDP).

Universities UK (2012). *The concordat to support research integrity.* : London: Universities UK. Retrieved May, 26, 2018, from https://www.universitiesuk.ac.uk/policy-and-analysis/reports/Documents/2012/the-concordat-to-support-research-integrity.pdf.

Urdan, T. C., & Maehr, M. L. (1995). Beyond a two-goal theory of motivation and achievement: A case for social goals. *Review of educational research, 65(3), 213-243*

Valk, J., Rashid, A. T., & Elder, L. (2010). Using mobile phones to improve educational outcomes:

An analysis of evidence from Asia. *International Review of Research in Open and Distance Learning, 11(1), 117-140.*

Vallerand, R.J. (2004). Intrinsic and extrinsic motivation in sport. *Encyclopedia of Applied Psychology, 2, 427-435.*

Van-Manen, M. J. (1977). Linking Ways of Knowing with Ways of Being Practical. *Curriculum Inquiry, 6 (3), 205-228.*

Vero, E., & Puka, E. (2017). The Importance of Motivation in an Educational Environment. *Formazione & Insegnamento, XV, 57-66.* Retrieved May, 15, 2018, from http://ojs.pensamultimedia.it/index.php/siref/article/viewFile/2164/1973

Vosloo, J. J. (2014). *A sport management programme for educator training in accordance with the diverse needs of South African schools.* Doctoral dissertation, Vanderbijlpark, North-West University, South Africa.

Wains, S. I. & Mahmood, W. (2008). Integrating m-learning with e-learning. *Proceedings of the 9th ACM SIGITE conference on information Technology Education (p. 31-38), Cincinnati, OH, USA, 16-18 October, 2008.*

Wang, R. & Ribera, A. (2016). Running head: Reading motivation and reflective and integrative learning. *Paper presented at the American Educational Research Association Annual Meeting, Washington, DC, April 2016.*

Watt, H. M. G., & Richardson, P. W. (2008). Motivations, perceptions, and aspirations concerning teaching as a career for different types of beginning teachers. *Learning and Instruction, 18, 408-428.*

We are social (2018). *Digital in 2018: Essential Insights into Internet, Social Media, Mobile, and Ecommerce Use around the World.* Retrieved on November, 29, 2018, from https://digitalreport.wearesocial.co

Wigfield, A. & Eccles, J. (2000). Expectancy -Value Theory of Achievement Motivation. *Contemporary Educational Psychology, (25), 68–81.*

Wilken, R. & Goggin, G. (2013). Mobilizing Place: Conceptual Currents and Controversies. In *Mobile Technology and Place, (pp. 3-25).* New York, US: Routledge

Wishart, J. (2015). Exploring the Use of Mobile Devices to Support Teacher Education. In *Encyclopedia of Mobile Phone Behavior (pp. 466-478).* Hershey PA, USA: IGI Global. Retrieved May, 5, 2018, from: http://39lu337z5l1lzjr1i1ntpio4.wpengine.netdna-cdn.com/wp-content/uploads/2015/12/Wishart-Mobile-Phone-Behaviour-Chap-Proof.pdf

Wittes J. (2002). Sample size calculations for randomized controlled trials. *Epidemiologic Reviews, 24(1), 39–53.*

Woods, S. P., Rippeth, J. D., Conover, E., Carey, C. L., Parsons, T. D., & Troster, A. I. (2006). Statistical power of studies examining the cognitive effects of subthalamic nucleus deep brain stimulation in Parkinson's disease. *The Clinical Neuropsychologist, 20(1), 27-38.*

Wordometers (2015). *Countries in the world (ranked by 2014 population).* Retrived December, 15, 2015 from http://www.worldometers.info/world-population/population-by-country/.

Wright, N. (2010). Twittering in teacher education: Reflecting on practicum experiences. *Open Learning, 25(3), 259-265.*

Yang, S. H. (2009). Using blogs to enhance critical reflection and community of practice. *Educational Technology & Society, 12(2), 11-21.*

Yesilbursa, A. (2013). Construct Validation of the English language teaching reflective inventory

with a sample of Turkish university EFL instructors. *English Language Teaching Journal, 6 (5), 28-37.*

Young, K. (2016). Teachers' attitudes to using iPads or tablet computers: Implications for developing new skills, pedagogies and school-provided support. *TechTrends, 60 (2), 183-189.*

Yuan, R., & Zhang, L. J. (2017). Exploring student teachers' motivation change in initial teacher education: A Chinese perspective. *Teaching and Teacher Education, 61, 142-152.*

Yusri, I. K., Goodwin, R., & Mooney, C., (2015). Teachers and mobile learning perception: Towards a conceptual model of mobile learning for training. *Procedia - Social and Behavioral Sciences, 176, 425–430.*

Zeichner, K. M., & Liston, D. P. (1996). *Reflective teaching: An introduction.* Mahwah, New Jersey: Lawrence Erlbaum Associates.

Zohrabi, M., & Yousefi, M. (2016). A study of the relationship between reflective teaching, and overall language proficiency of Iranian learners. *International Journal of English and Education, 5(20), 114-141.*

Zusho, A., & Maehr, M. (2009). Achievement Goal Theory: The Past, Present, and Future. In Wentzel, K. & Miele, D., Handbook of Motivation at School (p. 91-118). Routledge.

Appendices

Appendix A: The Reflective Teaching Instrument

File number:	Group	Gender:	School Location:	Teaching Experience (years):
16....................	**Experimental □** **Control (1) □** **Control (2) □**	Female □ Male□	Rural □ Urban □	.... Years

Dear respondent

This questionnaire is devised with the aim of looking into your actual teaching practices as a professional teacher. To that end, your careful completion of the questionnaire will definitely contribute to obtaining real data which is crucial for more accurate findings. Therefore, please check the box which best describes your actual teaching practices. The information will be kept confidential and will be used just for research purposes. Thank you very much in advance for your time and cooperation.

1: Never   2: Rarely   3: Sometimes   4: Often   5: Always

Items	Never	Rarely	Sometimes	Often	Always
1. I have a file where I keep my accounts of my teaching for reviewing purposes.	□ 1	□ 2	□ 3	□ 4	□ 5
2. I talk about my classroom experiences with my colleagues and seek their advice/ feedback.	□ 1	□ 2	□ 3	□ 4	□ 5
3. After each lesson, I write about the accomplishments/ failures of that lesson or I talk about the lesson to a colleague.	□ 1	□ 2	□ 3	□ 4	□ 5
4. I discuss practical/theoretical issues with my colleagues.	□ 1	□ 2	□ 3	□ 4	□ 5
5. I observe other teachers' classrooms to learn about their efficient practices.	□ 1	□ 2	□ 3	□ 4	□ 5
6. I ask my peers to observe my teaching and comment on my teaching performance.	□ 1	□ 2	□ 3	□ 4	□ 5
7. I read books/articles related to effective teaching to improve my classroom performance.	□ 1	□ 2	□ 3	□ 4	□ 5
8. I participate in workshops/conferences related to teaching/learning issues.	□ 1	□ 2	□ 3	□ 4	□ 5
9. I think of writing articles based on my classroom experiences.	□ 1	□ 2	□ 3	□ 4	□ 5
10. I look at journal articles or search the internet to see what the recent developments in my profession are.	□ 1	□ 2	□ 3	□ 4	□ 5
11. I carry out small scale research activities in my classes to become better informed of learning /teaching processes.	□ 1	□ 2	□ 3	□ 4	□ 5

12. I think of classroom events as potential research topics and think of finding a method for investigating them.	□ 1	□ 2	□ 3	□ 4	□ 5
13. I talk to my students to learn about their learning styles and preferences.	□ 1	□ 2	□ 3	□ 4	□ 5
14. I talk to my students to learn about their family backgrounds, hobbies, interests and abilities.	□ 1	□ 2	□ 3	□ 4	□ 5
15. I ask my students whether they like a teaching task or not.	□ 1	□ 2	□ 3	□ 4	□ 5
16. As a teacher, I think about my teaching philosophy and the way it is affecting my teaching.	□ 1	□ 2	□ 3	□ 4	□ 5
17. I think of the ways my biography or my background affects the way I define myself as a teacher.	□ 1	□ 2	□ 3	□ 4	□ 5
18. I think of the meaning or significance of my job as a teacher.	□ 1	□ 2	□ 3	□ 4	□ 5
19. I try to find out which aspects of my teaching provide me with a sense of satisfaction.	□ 1	□ 2	□ 3	□ 4	□ 5
20. I think about my strengths and weaknesses as a teacher.	□ 1	□ 2	□ 3	□ 4	□ 5
21. I think of the positive/negative role models I have had as a student and the way they have affected me in my practice.	□ 1	□ 2	□ 3	□ 4	□ 5
22. I think of inconsistencies and contradictions that occur in my classroom practice.	□ 1	□ 2	□ 3	□ 4	□ 5
23. I think about instances of social injustice in my own surroundings and try to discuss them in my classes.	□ 1	□ 2	□ 3	□ 4	□ 5
24. I think of ways to enable my students to change their social lives in fighting poverty, discrimination, and gender bias.	□ 1	□ 2	□ 3	□ 4	□ 5
25. In my teaching, I include less-discussed topics, such as old age, AIDS, discrimination against women and minorities, and poverty.	□ 1	□ 2	□ 3	□ 4	□ 5
26. I think about the political aspects of my teaching and the way I may affect my students' political views.	□ 1	□ 2	□ 3	□ 4	□ 5
27. I think of ways through which I can promote tolerance and democracy in my classes and in the society in general.	□ 1	□ 2	□ 3	□ 4	□ 5
28. I think about the ways gender, social class, and race influence my students' achievements.	□ 1	□ 2	□ 3	□ 4	□ 5
29. I think of outside social events that can influence my teaching inside the class.	□ 1	□ 2	□ 3	□ 4	□ 5

(Akbari et al., 2010, p.224)

Appendix B: The Work Tasks Motivation Scale for Teachers (WTMST)

Different reasons may explain why teachers engage in their work tasks. The following statements represent some of these reasons. Using the scale below, please indicate for each statement to what degree they correspond to one of the reasons for which you are doing the following work tasks.

Why are you doing this work task?

Class Preparation *(Planning lessons)*

(e.g., deciding on instruction topics and material, determining the presentation forms and   sequences, and establishing the work procedure).

Does not correspond at all 1	Correspond very little 2	Correspond a little 3	Correspond moderately 4	Correspond strongly 5	Correspond very strongly 6	Correspond completely 7

1.	Because it is pleasant to carry out this task.	1 2 3 4 5 6 7
2.	I don't know, I don't always see the relevance of carrying out this task.	1 2 3 4 5 6 7
3.	Because I like doing this task.	1 2 3 4 5 6 7
4.	Because my work demands it.	1 2 3 4 5 6 7
5.	Because I find this task important for the academic success of my students.	1 2 3 4 5 6 7
6.	Because the school obliges me to do it.	1 2 3 4 5 6 7
7.	I used to know why I was doing this task, but I don't see the reason anymore.	1 2 3 4 5 6 7
8.	Because it is important for me to carry out this task.	1 2 3 4 5 6 7
9.	Because I find this task interesting to do.	1 2 3 4 5 6 7
10.	I don't know, sometimes I don't see its purpose.	1 2 3 4 5 6 7
11.	Because I would feel guilty not doing it.	1 2 3 4 5 6 7
12.	Because if I don't carry out this task, I will feel bad.	1 2 3 4 5 6 7
13.	Because this task allows me to attain work objectives that I consider important.	1 2 3 4 5 6 7
14.	Because I'm paid to do it.	1 2 3 4 5 6 7
15.	To not feel bad if I don't do it.	1 2 3 4 5 6 7

(Fernet et al., 2008, p.277)

Why are you doing this work task?

TEACHING

(e.g., presenting instruction, answering questions, and listening to the students' needs)

Does not correspond at all	Correspond very little	Correspond a little	Correspond moderately	Correspond strongly	Correspond very strongly	Correspond completely
1	2	3	4	5	6	7

1.	Because the school obliges me to do it.	1 2 3 4 5 6 7
2.	Because if I don't carry out this task, I will feel bad.	1 2 3 4 5 6 7
3.	Because it is important for me to carry out this task.	1 2 3 4 5 6 7
4.	Because I find this task interesting to do.	1 2 3 4 5 6 7
5.	I don't know, sometimes I don't see its purpose.	1 2 3 4 5 6 7
6.	Because it is pleasant to carry out this task.	1 2 3 4 5 6 7
7.	To not feel bad if I don't do it.	1 2 3 4 5 6 7
8.	Because my work demands it.	1 2 3 4 5 6 7
9.	Because I would feel guilty not doing it.	1 2 3 4 5 6 7
10.	Because I find this task important for the academic success of my students.	1 2 3 4 5 6 7
11.	Because I like doing this task.	1 2 3 4 5 6 7
12.	I used to know why I was doing this task, but I don't see the reason anymore.	1 2 3 4 5 6 7
13.	I don't know, I don't always see the relevance of carrying out this task.	1 2 3 4 5 6 7
14.	Because I'm paid to do it.	1 2 3 4 5 6 7
15.	Because this task allows me to attain work objectives that I consider important.	1 2 3 4 5 6 7

(Fernet et al., 2008, p.277)

Appendix C: Some Screenshots of the Activity1 in the Twitter Platform (Arabic Version)

omani-z @omaniz2 · Mar 5
Replying to @Supervisor00024

omania-a @omaniaa2 · Mar 2
Replying to @Supervisor00024
ج.ه

omani-v @v_omani · Feb 26
Replying to @Supervisor00024
أ-ب-ج-

omani-lm @OmaniLm · Feb 26
Replying to @Supervisor00024
أ-ب-ج-د-ه

omania-l @l_omania · Apr 8
Replying to @Supervisor00024
د ب ج

omania-l @l_omania · Apr 8
ر

Abdulmajeed
@Supervisor00024   Follow

السؤال الأخير: افتح الصورة المرفقة (أجب عن السؤال المرفق بالصورة).

10:27 AM - 14 Jan 2017

4 Likes

25   4

---

omani-n @omanin3 · Apr 7
Replying to @Supervisor00024
ج٩
ج٩
ج٩
د٨

omani-wt @OmaniWt · Apr 3
Replying to @Supervisor00024
ج 10
ج 9
ج 7
د 10

omani-q @omaniq1 · Mar 31
Replying to @Supervisor00024
ج 8
ج 7
ج 8
د 8

omani-om @omaniom1 · Mar 19
Replying to @Supervisor00024
ج ج   ٩ ج   ٨ ج   د٩

Appendix D: Questions of the Activity1 in the Twitter Platform and in the Workbook (English Version)

Experimental group and Control group1

A. **To what extent (1-10) do you believe that you have the ability to plan a lesson perfectly?**

....

1- **What are the strength points in this plan?** (Choose an appropriate letter, you can choose more than one letter)

a. Teaching methods are varied. b. Clear learning strategies. c. Educational tools are varied.

d. The logical sequence of the lesson. r. Student activity is more than teacher activity. x. Employment of education technology.

u. Link science to student life. h. Showing individual differences.

w. Other: .... (Write it).

2- **What are the weak points in this plan?** (Choose an appropriate letter, you can choose more than one letter)

a. Teaching methods are limited. b. Learning strategies are unclear. c. Teaching aids are not available.

d. There is no logical sequence for the lesson. r. Teacher activity is more than student activity. u. Did not employ education technology.

x. There is no link to the science of student life. h. There is no consideration for individual differences.

w. Other: .... (Write it).

3- **After determining strength and weak points of this plan, are there any generalisations or conclusions which you have noted and related to planning a lesson**? (Choose an appropriate letter, you can choose more than one letter)

a. Very large Number of low level students is in this class so you have to reflect and think about that.

b. You must adopt learning strategies that are capable to make students work hard in achieving the lesson goals.   c. The provision of teaching aids and the employment of educational technology are indispensable in any lesson.   d. Students in this class need to strengthen their motivation to learn.

r. planning of the lesson should focus on making students the centre of the teaching and learning process. x. Individual activity is better than group activity. u. It is important to start any lesson by linking the topic to the student's life.

h. The system must prevail before starting the teaching process.   w. Other:

.... (Write it).

4- **Explain your plan in applying this new generalisation in future.** (Choose an appropriate letter, you can choose more than one letter)

a. A quarter of an hour a day will be spent with a low-level student to discuss with him and understand his problems that hinder his learning.

b. In order to stimulating students' motivation you need to search in educational literature. Thus, you will devote some time to learn experiences of others in this regard.   c. You will search at books or online for new teaching methods.   d. You will learn how to download videos from the Internet and how to edit it.

r. You will reflect on each lesson to find ways to overcome students' learning disabilities.   x. You will rethink in how you apply activities in group form.

u. You are a distinguished teacher with long experience and you do not need to reflect.   h. Teaching of each concept or phenomenon will begin by explaining the importance of that concept or phenomenon in the students' life in order to increase their motivation.

w. Other: .... (Write it).

B. **To what extent (1-10) do you believe that you have the ability to plan a lesson perfectly?**

....

C. **Do you consider this activity as:**   (Circle a number in each choices from a - g)

a. Useful----10----9----8----7----8----7----6----5----4----3----2----1----Not useful.

b. Important ----10----9----8----7----8----7----6----5----4----3----2----1---- Not important

c. Interesting ----10----9----8----7----8----7----6----5----4----3----2----1---- Not interesting**.**

d. Not costly ----10----9----8----7----8----7----6----5----4----3----2----1---- Costly

Appendix E: Answers of the Activity1 in the Twitter Platform (English Version)

n	Nickname	Qa	Q1	Q2	Q3	Q4	Qb	Q5
1	Omani-n	8	A d x	r	A b d r	B d r h	8	9
								9
								9
								8
2	Omani-lm	8	A b c d x	A b c d h	A b c r h	A b c r h u	8	8
								9
								8
								7
3	Omania-a	9	B c	C h	A b c r	A b x	9	9
								9
								9
								9
4	Omania							
5	Omani-z	8	A b c d	h	A b c h r	A b c d h	8	9
								9
								8
								9
6	Omania-l	8	A d u x	B c d r	A b c u	A b h	8	8
								8
								8
								8
7	Omani-v	9	A b c d	A b c	A b c h r u Individual and cooperative activity depends on the type of exercise.	A b c d r		9
								9
								8
								9
9	Omania-tu	8	A b c	r	A c r	C h x		
11	Omani-om	9		r	A c r	A h	9	9
								9
								8
								9
12	Omani-q	8	A b r	C h	A b h	B c x	8	8
								7
								8
								8
13	Omani-bn	9	A b c d h x u	r	A b h r	A b c h	9	9
								9
								9
								9
14	Omani-u	9	A c x	C x	b	A x	9	9
								8
								8
								8
15	Omani-w	7	A b r	c	A c r	B c	9	10
								9
								9
								10
16	Omani-i	8	A b d x	H r	A r h			8
								9
								8
								8
17	Omani-yp	9	A b d x	C h	A b r	A b r h	9	9
								9
								9
								10
18	Omania-j	7	A c d r x	C h	A b c h r	B h w	8	8
								8
								7
								10
19	Omania-f	6	A b c d r x	H u	A b d h r u	A b d h	8	8
								8
								8
								8
20	Omania-hi	9	A b c d x	H r	A b c r u	B c r h u	10	9
								8
								7
								8
21	Omani-tc	7	A c u	H x u	A c r	A b h	9	8
								8

								9
								8
22	Omania-yt							
23	Omania-r	9	B d r u	A c x	A b c d h r u	A c d h x	9	10
								10
								10
								7
24	Omania-c							
	Omania-g							
	Omani-oo	8	A b c d				8	9
								8
								9
								8
	Omania-op	9	A d x		A c r h	B c h	8	9
								7
								9
								10
	Omania-t							
	Omania-x							9
								10
								10
								8
	Omani-wt	10	A b c d r x	C r	A b c r h	A b c h	10	10
								9
								7
								10
	Omani-as	9	A b r u	d	A b c x	A c h r	9	9
								9
								9
								8

Appendix F: An Example of the Activity1 in the Workbook (Arabic version)

رقم (٢): التخطيط لحصة دراسية:

أ. إلى أي مدى من (١-١٠) تعتقد بأن لديك القدرة على إعداد خطة لحصة دراسية على نحو متميز؟ 9

تأمل في التخطيط (التحضير) السابق لحصة دراسية وأجب عن الأسئلة التالية:

١ ـ ما نقاط القوة في هذه الخطة؟

(ضع دائرة حول الرمز المناسب، يمكنك اختيار أكثر من رمز)

أ.طرق التدريس متنوعة
ب. استراتيجيات التعلم واضحة
ج. الوسائل التعليمية متنوعة
د.التسلسل المنطقي للدرس
ه ربط العلوم بحياة الطالب
ر. نشاط الطالب أكثر من نشاط المعلم
ط. توظيف تكنولوجيا التعليم
هـ. تتضح فيها مراعاة الفروق الفردية

و. أخرى: .... (اكتبها).

٢ ـ ما نقاط الضعف في هذه الخطة؟

(ضع دائرة حول الرمز المناسب، يمكنك اختيار أكثر من رمز)

أ طرق التدريس محدودة
ب استراتيجيات التعلم غير واضحة
ج. الوسائل التعليمية غير متوفرة
د. لا يوجد تسلسل المنطقي للدرس
ح. لا يوجد ربط للعلوم بحياة الطالب
ر. نشاط المعلم أكثر من نشاط الطالب
ط. لم توظف تكنولوجيا التعليم
هـ. لا يوجد مراعاة للفروق الفردية

و. أخرى: .... (اكتبها).

٣ ـ بعد تحديدك لنقاط القوة ونقاط الضعف لهذه الخطة، هل هناك أية تعميمات استنتجتها وترتبط بعملية التخطيط لحصة دراسية؟ اذكرها.

(ضع دائرة حول الرمز المناسب، يمكنك اختيار أكثر من رمز)

أ التخطيط الجيد لطرق التدريس وتنوعها يزيد من دافعية الطلاب
ب لابد من تبني استراتيجيات تعلم تجعل الطالب مندمجا في تحقيق أهداف الحصة.
ج توفر الوسائل التعليمية وتوظيف تكنولوجيا التعليم أمر لا غنى عنه في أي درس.
د. لتدريس مفهوم معين لابد من توظيف اما الطريقة الاستقرائية أو الطريقة الاستنتاجية.
ي لابد أن يركز التخطيط للحصة على يكون الطالب محور العمل والنشاط في الحصة
ط. النشاط الفردي أفضل من النشاط الجماعي
ه من المهم بدء أية حصة بربط موضوع الدرس بحياة الطالب.
هـ. لمراعاة الفروق الفردية لابد من توظيف استراتيجية التعلم في مجموعات

و. أخرى: .... (اكتبها).

٤ ـ اشرح خطتك المستقبلية في تطبيق هذه التعميمات التي توصلت اليها. (ضع دائرة حول الرمز المناسب، يمكنك اختيار أكثر من رمز)

أ البحث في الانترنت عن خطط جاهزة عن موضوع الدرس والاستفادة منها.
ب. عند كل تخطيط لأي درس سأبحث في الـ youtube أو في محركات البحث المختلفة عن أي فلم يرتبط بالدرس.
ج ستبحث في الكتب أو في الانترنت عن طرق تدريس جديدة.
د. تقوم بتعلم كيفية تحميل الفيديو من الانترنت وكيفية تقطيعه.
ر. ستزيد من الأنشطة الفردية
ط. ستعيد النظر في أسلوب توظيفك للأنشطة الجماعية
ع. ستزيد من أسئلة الواجب.
ه ستبدأ تدريس كل مفهوم أو ظاهرة بتوضيح مدى أهمية ذلك المفهوم أو تلك الظاهرة في حياة الطالب وذلك لزيادة دافعيته.

و. أخرى: .... (اكتبها).

ب. إلى أي مدى من (١-١٠) تعتقد بأن لديك القدرة على إعداد خطة لحصة دراسية على نحو متميز؟ 9

٥ ـ هل تعتبر هذا النشاط على أنه:

(ضع دائرة حول أفضل رقم تراه مناسبا لكل الرموز من (أ - ث):

أ. غير مفيد ----١----٢----٣----٤----٥----٦----٧----٨----٩----⑩--- مفيد
ب. غير مهم ----١----٢----٣----٤----٥----٦----٧----⑧----٩----١٠--- مهم
ت. غير مثير ----١----٢----٣----٤----٥----⑥----٧----٨----٩----١٠---- مثير للاهتمام
ث. مكلف ----١----٢----٣----٤----٥----٦----٧----٨----⑨--١٠---غير مكلف

312

Appendix G: Some Screenshots of the Activity2 in the Facebook Platform (Arabic Version)

الاساليب التي يمكن ان يستخدمها المعلم لمراعاة الفروق الفردية:

1. اثارة دافعية الطالب لعملية التعليم.
2. اعلام الطالب بالاهداف المراد تحقيقها.
3. استخدام المعلم اسلوب التشويق وجذب الانتباه عن طريق توظيف الاسئلة بطريقة مناسبة وتوظيف الوسائل المتنوعة كاوراق العمل والبطاقات التعليمية وبطاقات طلاقة التفكير وغيرها.
4. تنويع اساليب التعزيز وطرائقه وبرامجه.
5. تجنب الالفاظ القبيحة والجارحة للطالب مما يضعف الاقبال على العلم.
6. استخدام المؤثرات الصوتية في اثناء الدرس ورفع الصوت وخفضه كما يتناسب مع الموضوع.
7. غرس روح التنافس الشريف بين الطلاب.
8. تعزيز الجوانب الايجابية لدى الطالب.
9. اكساب الطلاب الثقة بانفسهم لتحقيق النمو الذاتي الصحيح لبناء الشخصية على افضل وجه.
10. تشجيع العمل في مجموعات ، فالمجموعات الصفية توفر اليات التواصل الاجتماعي وتسمح بتبادل الافكار وتوجيه الاسئلة بشكل حر ، وشرح الفرد للاخر ، ومساعدة الغير في فهم الافكار بشكل له معنى والتعبير عن المشاعر.

Appendix H: Questions of the Activity2 in the Facebook Platform and in the Workbook (English Version)

Activity 1: Teaching Skills: *Individual differences*

A. To what extent (1-10) do you believe that you have the ability to take care of differentiation between students? ....

1- What are your strategies in taking care of differentiation between students?

a. Implementing of collaborative learning.   b. Diversity in teaching methods.   c. Diversity in teaching tools.
d. The logical sequence of the lesson.   h. Focussing on making students as a centre of the educational process.
w. Applying of education technology.
m. Formulate questions that suit different abilities.   l. Provides enrichment activities for excellent students.
y. Other: .... (Write it down).

2- To what extent (1-10) do you feel satisfied in taking care of differentiation between students? ....

3- What are the strategies that proved effectiveness in taking care of differentiation between students?

a. Variation of teaching methods.   b. Increasing number of home works.   t. Diversification of teaching tools.
c. Taking care of continuous evaluation.   d. Encouraging summarizing lessons.   u. Organizing Information: for example, employing the concept map.
r. Taking the theory of multiple intelligences into account.   x. Deal with students as the centre of the educational process.
w. Other: .... (Write it down).

4- Watch the following video or read the article below that show the strategies and opinions of some educational experts in dealing with differentiation between students.

5- After watching these videos, what are the new strategies (if existed) that you may follow in order to take care of differentiation?
....
....

6- In general, what are your best strategies for taking care of differentiation between students and how will you apply them
practically?...
....

B. To what extent (1-10) do you believe that you have the ability to take care of differentiation between students? ....

C. Do you consider this activity as: (Circle a number in each choices from a - d)

a. Useful----10----9----8----7----8----7----6----5----4----3----2----1----Not useful.
b. Important ----10----9----8----7----8----7----6----5----4----3----2----1---- Not important
c. Interesting ----10----9----8----7----8----7----6----5----4----3----2----1---- Not interesting.
d. Not costly ----10----9----8----7----8----7----6----5----4----3----2----1---- Costly

---

Appendix I: Answers of the Activity2 in the Facebook Platform (English Version)

Activity 1: Teaching Skills: *Individual differences*

n	Nickname	Qa	Q1	Q2	Q3	Q5	Q6	Qb	Q7
1	Omani-n	9	b h m l	7	a d r	a. Giving each student his right regarding classroom activities and continuous assessment. b. Getting down to the level of the weak students as well as taking into account other students who have higher abilities.	a. Diversification in home works and activities b. Enhancing students' motivation.	8	9 9 9 8
2	Omani-lm	9	a b c d h l	8	a b t c d x	a- Motivating students' learning through the diversity of teaching methods and the use of new strategies in teaching which could be loved and could be interested to the students, away from the method of indoctrination. b - Activating the cooperating learning. c - Diversification in educational aids that is beloved and interesting to the student. d - Enhancing values of citizenship. e - Taking into account the needs of students.	a. Diversification in teaching methods. b. Activating the cooperating learning. c. Using a diversity of teaching aids that could stimulate students toward learning.	9	8 9 9 8
3	Omania-a	8	b c d h m	8		Diversification in the teaching methods and diversity of teaching aids through the use of technology.	a. Diversification in teaching methods. b. Using a diversity of teaching aids.	9	9 9 8 8
4	Omania	7	b l o	9	a t x				
5	Omani-z	8	a b c d l m	8	a t c	a- Diversifying teaching methods and teaching aids. b - The use of collaborative learning. c. Providing different and comprehensive activities that suit the levels of students.	a. Activating the cooperating learning. b. Using attractive teaching aids.	8	9 9 8 9
6	Omania-l	9	a b c d o l m	8	a b d t	a. Asking the high performance students to help with low performance students. b. Activating the cooperating learning.	a. Diversification in teaching methods. b. Activating the cooperating learning. c. Using a diversity of teaching aids that could stimulate students toward learning. d. Diversification in activities based on students' different levels.	9	9 9 9 8
7	Omani-v	9	a b c d h l m Attempting to be closer to the student and find the way through which they	9	a c d x	a. Variation in teaching aids and methods of teaching with trying to present some sections that	a. Diversification in teaching methods and aids and using stimulation program to show some	9	9 9 9 -

317

might accept the information. This is because each student has a special mode and personal tendencies through which they can be motivated.

explain scientific experiments which cannot be done in the laboratory.
b. Forming groups with different roles and give them the opportunity to prepare a lesson and make an explanation on the blackboard.

experiments.
b. asking students to teach in some lessons ,using an interactive white board and conducting entertaining competitions that include questions related to the lesson.

9	Omania-tu	8	a b c d h l m	7	a c d x	-			
11	Omani-om	8	b c d m	8	a c d	Through the presentation of educational sections that simplify the information for the student	a. Diversification in teaching methods. b. Diversity in asking questions and its levels.	9	10 9 8 10
12	Omania-mn	7	a b c d l	7	d r o	a. Assign an administrator to each group. b. Intensifying activities and exercises.	a. Diversification in teaching methods. b. Activating the cooperating learning.	9	9 9 9 9
13	Omani-bn	7	b h o l	8	d x	a. Using scientific story approaches. b. Applying technology in teaching.	a. Diversification in teaching methods. b. Activating e-learning.	9	10 9 8 10
14	Omani-u	8	a b l m	9	a d r t x	a. Diversification in teaching methods through video clips and other forms. b. Asking students to write prepare lessons.	a. Diversification in teaching methods. b. Cooperation between excellent and weak students in academic learning.	9	9 8 8 10
15	Omani-w	7	b c o m	8	C Using technology in teaching (interactive whiteboard)		a. Stimulating students' motivation toward lesson topics and connecting them to the real life. b. Using visual presentations in order to strengthen information in their mind.	9	9 10 9 10
16	Omani-i	8	a b c o	8	a d t	Using attractive teaching methods with all kinds of reinforcement.	a. Diversification in teaching methods. b. Using visual tools. c. Cooperative learning.	8	9 8 9 9
17	Omani-yp	9	a b c d h o l m	9	a b c d r t x	Diversification of activities to suit group's capabilities, where the system of groups with similar levels is applied so that the low-level groups feel that they are able to complete the tasks.	a. Diversification in teaching methods. b. Cooperative learning. c. Different levels of activities. d. Different types of reinforcement.	8	10 10 10 10
18	Omania-j	8	a b c d h o m l	8	a c d	Stimulating students' motivation and working as groups of different levels, creating an atmosphere of love, competition, continuous reinforcement and employing technology.	a. Cooperative learning. b. Diversification in teaching methods. c. Gradient in questions. d. Creating an atmosphere of lovely and funny competitions.	10	10 10 10 10
19	Omania-f	8	a d m	8	a b d	a. Enhancing the positive aspects of the	a. Cooperative learning.	9	8 9

#	Name								
						student. b. Diversity in the level of activities. c. Encouraging work in groups.	b. Enhancing the positive aspects of the students. c. Avoiding ugly words. d. Diversity in activities and teaching methods.		8 9
20	Omania-hi	8	a b c d o m	8	a c d t x	a. Motivating students' motivation to learn. b. Using attractive teaching methods. c. Encouraging work in groups. d. Instilling a spirit of honest competition among students.	a. Using attractive teaching methods. b. Cooperative learning.	9	10 10 8 8
21	Omani-tc	7	a b d m	4	a d x	a. Stimulating students' motivation. b. Diversification of teaching methods. c. Simplifying the purpose of lessons. d. Understand the requirements and demands of students.	a. Diversification in teaching methods. b. stimulating motivation. c. diversity in questions. d. simplify goals of lessons.	8	7 10 9 7
22	Omania-yt	8							
23	Omania-r	8	A b c d h o l m	8	a b c d r x	a. Stimulating students' motivation. b. Helping students to gain confidence in their selves. c. Understanding the reasons for students' failure, whether they are due social reasons or other reasons and develop solutions for that. d. Discussions with peers e. Creating a suitable classroom environment. f. Diversification of reinforcement methods. g. Diversification of teaching methods.	a. Diversification of teaching methods. b. Diversification of reinforcement c. Distributing students correctly to learn from their peers. d. Taking care of students socially and academically.	9	10 9 10 9
24	Omania-c	6	a b c m l	6	b d t	Implementing a cooperative learning in most lessons and asking a student with high performance in the group to supervise weak students.	a. Cooperative learning. b. Enrichment activities. c. Using a diversity of teaching aids.	9	10 10 10 8

319

Appendix J: The Cover Page of the Main Study's Workbook (Arabic version)

الصف العاشـر

سِـجـــل تـحضير

إسم المعلم: ....

إسم المدرسة: ....

السنة الدراسية: ....
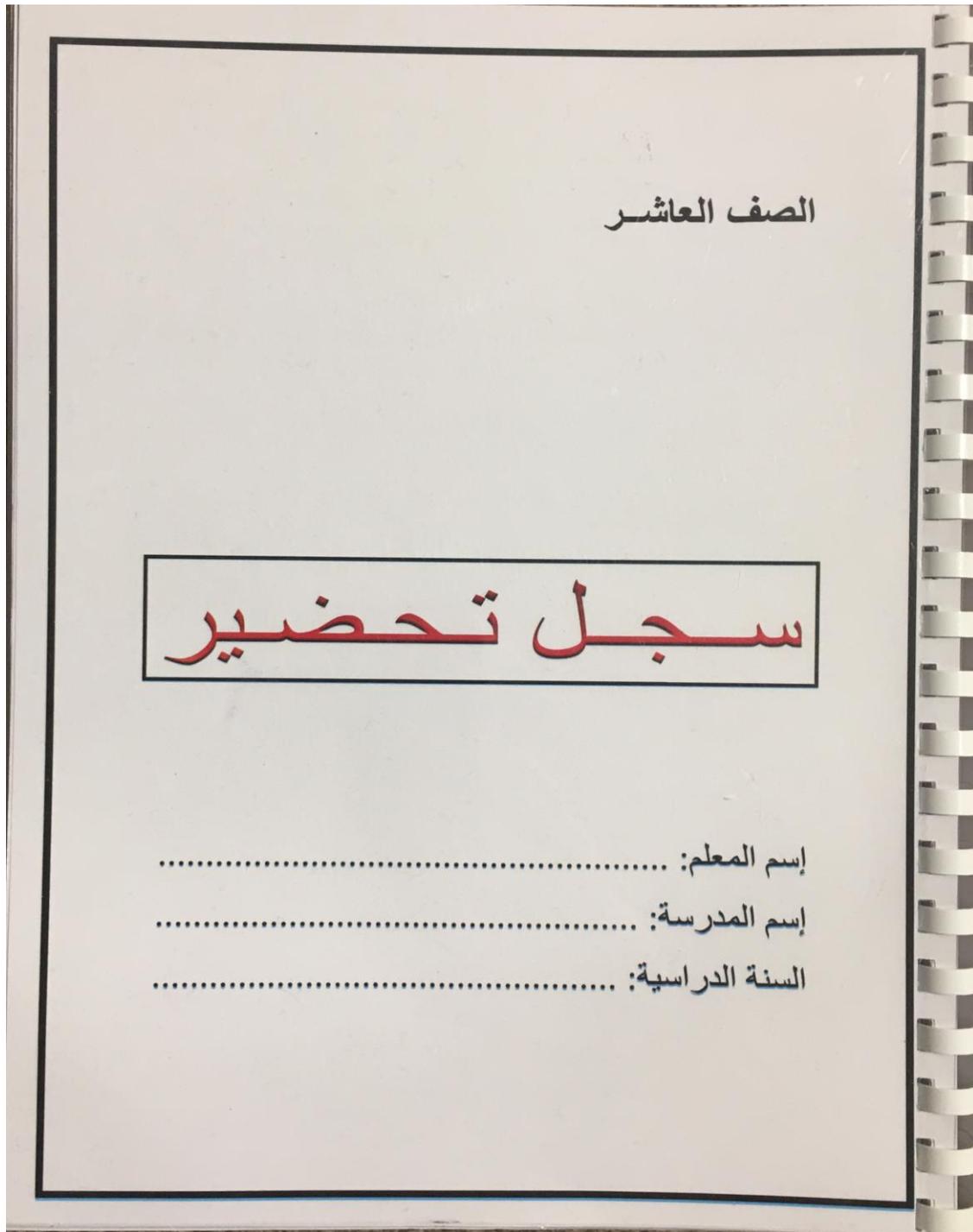
Appendix K: An Example of the Activity2 in the Workbook (Arabic version)

قم (١): مراعاة الفروق الفردية:

إلى أي مدى من (١-١٠) تعتقد بأن لديك القدرة على مراعاة الفروق الفردية بين الطلاب على نحو متميز؟ ...8

١- ما هي الاستراتيجيات التي تتبعها في مراعاة الفروق الفردية بين الطلاب؟ *(ضع دائرة حول الرمز المناسب، يمكنك اختيار أكثر من رمز).*

① توظيف التعلم التعاوني   ب. تنوع في طرق التدريس   ج. تنوع في الوسائل التعليمية
د. التسلسل المنطقي للدرس   ر. تركز على أن يكون الطالب محورا للعملية التعليمية   ⓗ توظيف تكنولوجيا التعليم
ⓣ تصيغ أسئلة تناسب مختلف القدرات   ⓗ توفر أنشطة اثرائية للطلاب المتفوقين
و. أخرى: ....نوع في الأساليب التحفيزية......... *(اكتبها).*

٢- إلى أي مدى من (١-١٠) تشعر بالرضا من مستوى مراعاتك للفروق الفردية بين الطلاب؟ 8

٣- ما الأساليب التي تستخدمها وتعتقد أنها أثبتت فعاليتها في مراعاة الفروق الفردية بين الطلاب؟ *(ضع دائرة حول الرمز المناسب، يمكنك اختيار أكثر من رمز).*

أ. تنويع طرق التدريس   ب. زيادة عدد الواجبات   ⓙ تنويع الوسائل التعليمية
① الاهتمام بالتقويم المستمر   ر. التشجيع على تلخيص الدرس   ⓣ تنظيم المعرفة: مثلا توظيف خارطة المفاهيم.
هـ. أخذ نظرية الذكاءات المتعددة بعين   ع. جعل الطالب محورا للعملية التعليمية.
الاعتبار
و. أخرى: .... *(اكتبها).*

٤- اقرأ النص المكتوب في الصفحة التالية والمرتبط برأي الخبراء والأدب التربوي بموضوع مراعاة الفروق الفردية.

٥- بعد قراءتك للنص: ما الأساليب الجديدة (ان وجدت) والتي ترى أنه يمكن اتباعها في مراعاة الفروق الفردية بين الطلاب؟ ..استخدام المؤثرات الصوتية في أثناء الدرس ورفع الصوت وخفضه كل يتابعني. جميع الموضوع.

٦- بشكل عام وبعد انتهائك من هذا النشاط: ما هي الاستراتيجيات والأساليب المثلى والتي تجدها الأفضل وستتبعها عند مراعاتك للفروق الفردية بين الطلاب في حصصك المقبلة؟ *(حدد أسلوبين على الأقل).*
ـ ..تشجيع العمل في مجموعات.......
ـ ..تعزيز الجوانب الايجابية لدى الطلاب.....

ب. إلى أي مدى من (١-١٠) تعتقد الآن بأن لديك القدرة على مراعاة الفروق الفردية بين الطلاب على نحو متميز؟ 9

٧- هل تعتبر هذا النشاط على أنه: *(ضع دائرة حول أفضل رقم تراه مناسبا لكل الرموز من (ظ – ف):*

ظ. غير مفيد ----١----٢----٣----٤----٥----٦----٧----٨----٧----٨---⑨---10---- مفيد
ع. غير مهم ----١----٢----٣----٤----٥----٦----٧----٨----٨---⑦----٩---10---- مهم
غ. غير مثير ----١----٢----٣----٤----٥----٦----٧----٨---⑦----٨----٩----10---- مثير للاهتمام
ف. مكلف ----١----٢----٣----٤----٥----٦----٧----٨----٧----٨----٩---⑩---غير مكلف

321

Appendix L: A Diary Card Example (Arabic version)

بطاقة يوميات

تحديد عدد مرات توظيف تطبيقات الهاتف النقال في التعليم والتعلم

Date   Fields of use   Applications

يرجى التكرم بتسجيل وتوثيق توظيفك لبرامج وتطبيقات الهاتف النقال (البريد الالكتروني،
جوجل، يوتيوب، واتس أب، وغيرها من التطبيقات) سواءا في التعليم والتعلم والتدريب أو
التواصل مع العاملين في الميدان التربوي.

التاريخ	مجال استخدامه (البحث، التواصل مع معلم أو مشرف، مشاهدة فيديو تعليمي، أية أغراض أخرى)	اسم التطبيق	م
٢٠١٣/١/١٩	تنزيل كتيب المعلم النشط	تليجرام	١
١٧/١/٢٥	التواصل مع مطبعة اكاديميا لطبعة طلاب	البريد الالكتروني	٢
١٣/٢/١	التواصل مع العاملين في الميدان (هروب المدرسة كسر ان	واتس اب	٣
١٧/٢/١٦	تصفح مرفح (عرض من الكتاب	تويتر	٤
١٧/٣/٧	تصفح هشتاق من - روابط العلوم	فيس بوك	٥
١٧/٣/٧	تصفح حساب المشرف والمدرسة	المستجرام	٦
١٧/٣/٩	تصفح صفحة الكتب والكون التربوية	تليجرام	٧
١٧/٣/١٢	متابعة دورة الكون الكترونية	تويستر	٨
١٧/٣/٢٠	تصفح تشريح الزراعة	Outlook	٩
١٧/٣/٢٧	السقوط الحر سي حساب SLiTalk	فيبر	١٠
١٧/٣/٢٧	تحميص من جريدة المدرسة	واتس ان	١١
١٧/٢/٢٨	تحميص د	هاتس اب	١٢
١٧/٣/٢٨	ارسال استراتيجيات المعلم النشط	واتس ان	١٣
١٧/٣/٢٩	تنزيل كتاب ٢ و/على راشد في الميدان العلمي	تليجرام	١٤
١٧/٤/١		واتس اب	١٥
١٧/٤/٤	عروض الكوت ..	موقع السبورة التفاعلية	١٦
١٧/٤/١٥	جروب المدرسة سه نعيم	واتس اب	١٧
			١٨
			١٩
			٢٠
			٢١
			٢٢
			٢٣
			٢٤
			٢٥
			٢٦
			٢٧
			٢٨
			٢٩
			٣٠

An example of a diary card that was used by the Control Group2

في حالة عدم استخدام أيا من هذه التطبيقات يرجى كتابة (لم يتم توظيف أي تطبيق) في الفراغ التالي:
....

Appendix M: Examples of the Pilot Study's Workbook (Arabic version)

Appendix N: Illustrative example of how data reduction and analysis were performed

Example: The Impact of the Intervention on Teachers' Reflective Practices

(See 5.3 Summary of the Chapter, and 8.4 Conclusion)

> **The conclusion:** the experimental group programme which was hosted mainly on two mobile applications - Twitter and Facebook – and designed based on two models of reflection, Kolb's cycle and Gibb's cycle, had a positive impact on teachers' reflective practices, more than the other two programmes (control group1: using workbook and control group2: using diary cards). However, the differences between the study groups in their reflective practice levels were not statistically

In order to reach the previous conclusion three sources of data were used.

1- Evidence from interview data

The interview data were provided by 21 informants who were randomly chosen to be interviewed. 10 informants were from the experimental group, and 5 informants were from each of the other groups - control group1 and control group2. The researcher asked the informants the following main question, after they finished implementing the activities in the last week of the intervention:

Explain the impact of the professional development programme (using mobile applications/workbook/diary card) on your motivation towards teaching? Give examples?

The interview data showed that the programme of the experimental group improved their self-reported reflective practice levels while this is not the case with the other two groups. Many informants in the experimental group described their programme as a useful programme, which had a positive impact on their reflective practices. In fact, seven of the ten experimental group participants mentioned that using mobile applications as a training platform, specifically, increased their reflective practices. For instance, Omania-j teacher claimed that the programme increased his level of reflective practices to reach nine out of ten, while Omani-i teacher claimed that his reflection level became higher than before. Another teacher said: *"my reflection on my teaching skills became better"* (Omani-om teacher).

The data from these interviews were analysed thematically, using a method of analysis developed by Braun and Clarke (2006). The researcher utilised the Nvivo11

programme in order to provide rigour to the analysis of the interview data. He first read the transcripts in order to be familiar with them. Then, introductory codes were created such as: training, time, curriculum, students' motivation, teachers' experience, administrative burdens and teaching burdens, love of the work, money, financial and moral support, teachers' workloads, trust in teachers, relationships among staff in schools, school environment, educational aids, conscience, satisfaction, relationship with the school administration, reading, teachers' cultures and values, preparation period to be teachers, discussion with inspectors, the observation of God, and professional development.

The frequency of some of these codes was high and, in some cases, it was very low. For example, there were 7 references for the code *reading*, while only one reference for the code *the observation of God* (this teacher explained that, for her, reflective practice allowed her teaching to be rooted in God's teachings). For each code, the information was gathered in a way that links each piece of information to the code that represents it. For instance, under the codes *reading*, *time, and workload*, Omania-f teacher saying, "*I don't have time to read things about good teaching from the literature on that topic*".

After that, themes were formed by connecting each code to its relevant node. For example, the following codes: *training, reading, preparing period to be teachers, and discussion with inspectors* formed the theme *professional development*. This theme was then examined to determine whether it is homogeneous (having coherent patterns) and could fit together (with other themes) to form a meaningful thematic map. The researcher first reviewed the codes in terms of their relation to the theme meaning, their frequency, and their contribution to it. He then decided that they could all fit together to form the suggested theme. Finally, the suggested theme was given meaning in order to understand the point of view that each theme refers to. Through the previous steps the interview data revealed the influences that are said by teachers to affect their reflective practices. This was helpful to understand how the programmes affected the participants' reflective practices.

Experimental group opinions:

The following table shows a summary of the participants' appraisal of training platforms using mobile applications with a specific programme in relation to reflective practices.

A summary for the experimental group participants' appraisal of their training programme

The type of appraisal	No of references	Sample contents
Positive	19	Useful experiment, understanding some teaching skills better than before, understanding my level in teaching and planning compared to my colleagues, understand students more, thinking more about students' needs, ready plans gave me more time to reflect and search, **increased my reflective practices**, improved ways of planning a lesson, improved my teaching methods, evaluate my teaching skills.
Neutral	0	-
Negative	1	I still find difficulties in improving some of my teaching skills.

The following screenshot shows how Nvivo11 was used to create the previous table:

Furthermore, the following example shows short coded extract of interview data provided from an informant in the experimental group about the impact of their intervention. Omani-n claimed that the programme gave him more time for practising reflection and this has been coded as the screenshot of Nvivo11 shows:
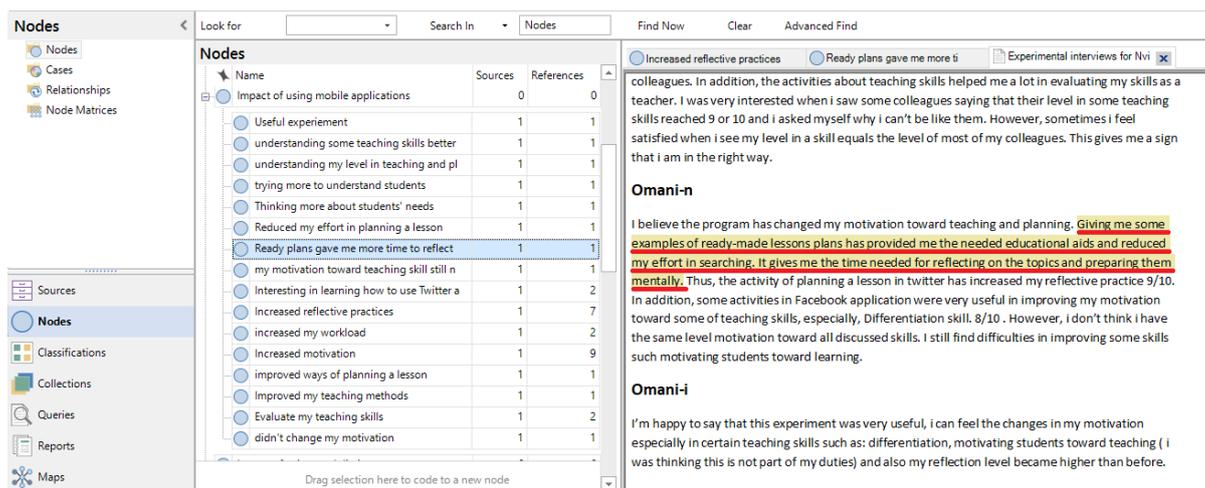
Control group1 opinions:

In contrast, the positive opinions about the programme in the case of the control group1 were fewer than the experimental group. The following table presents a summary of the participants' appraisal of training platforms using workbooks, in relation to developing reflective practices.

A summary for the control group1 participants' appraisal of their programme

The type of appraisal	No of references	Sample contents
Positive	5	Useful workbook, reminding us of some teaching skills, increased my reflective practices.
Neutral	1	I don't know if there is a change in my reflection after participating in this experiment.
Negative	2	No effect on my reflective practices level.

As shown in the table above, five references describe this programme as useful with a positive impact on their reflective practices, while two informants felt that the programme had no effect in enhancing participants' reflective practice levels. One informant was not sure if that programme had an impact on his reflective practice levels. It can be noted that there is a big difference of references between the two groups (experimental and control group). This leads to the conclusion that the influences of the experimental group programme regarding improving teachers' reflective practices are more than the influences of the control group1 programme.

Control group2 opinions

Finally, control group2, who were encouraged to use mobile applications without offering them a specific programme, mentioned that there is no positive impact of this programme regarding their reflective practices. The following table presents a summary of the participants' appraisals of training platforms using mobile applications without a specific programme.

A summary for the control group2 participants' appraisal of their programme

The type of appraisal	No of references	Contents
Positive	0	-
Neutral	1	I don't know if there is a change in my reflection.
Negative	5	Not effective on enhancing reflective practice levels.

The table above shows that there is no perceived positive influence of control group2's programme on them. It seems that we should not expect any positive impact on teachers' reflective practices solely due to the use of mobile apps. A specific programme is needed for that purpose. For instance, Omania-A$_3$ stated: *"I just felt that it is important to use some of the mobile applications, but I don't know if this has any effect on my reflection".*

Note that there are only 5 interviewees in the control group1 and also in the control group2, as opposed to 10 in the experimental group – so the number of positive references per interviewee is 1.9 (experimental group), 1.0 (control group1), and 0.0 (control group2).

Comparing the responses of all groups (experimental group, control group1, and control group2) may lead us to expect that the positive impact of using mobile applications as a training platform on science teachers' reflective practices, when assessed quantitatively, would be significantly better than its counterpart in control group1 and control group2.

For the purpose of increasing the interview reliability, the researcher trained for interviewing during the piloting stage. He conducted six interviews with six different informants (three male and three female) who taught 9th Grade students during that stage. He also continued to check the interview guide until he felt that the questions were sufficient (in quantity and quality) to achieve the goal of conducting interviews. Furthermore, the researcher ensured the coding reliability by undertaking the coding process twice during a separated period of time of almost three weeks, and then compared the differences between them (intra-rater reliability) which were only a few.

2- Evidence from the activities data

Second, the analysis of activities of the experimental group and control group1 showed that the experimental group participants have engaged in the activities of reflection slightly more than the participants in the control group1. This may indicate that their progress in reflective practice might be better than those who have engaged less. As a result, we can expect that their improvement in the reflective practice levels might be better than their counterparts in the control group1. The engagement of the participants in the activities was assessed based on four aspects:

1- To what percentage (%) did the participant answer the questions *(P)*?
2- To what extent did the participant add extra answers *(Ex)* to the provided multiple choice answers?
3- To what extent did the participant answer the open questions *(O-q)*?
4- To what extent are the answers to the open questions related to the attached articles and videos *(R)*?

The researcher gave each factor a specific mark based on his judgement on the importance of each of them. The total mark available for each participant in each activity is 100, and they were divided according to the following table.

Estimation of Participant Engagement in an Activity

n	The criteria	The Mark
1	The percentage (%) of participants' answers of the activities (P)	50
2	Adding extra answers to the multiple-choice answers (Ex)	13
3	Answering the activities' open questions (O-q)	25
4	The relation of the open questions answers to the attached article and videos (R).	12
Total		100

1- The percentage (%) of participants' answers of the activities (P):

Answering all activity questions is a positive sign of engagement, therefore, the researcher awarded 50 marks for this factor. This was done through applying this equation: (number of answers for the activity's questions / number of questions of the activity x 100%),

then dividing the result by 2. If the percentage is 100, then the participant will get 100/2 = 50 marks.

2- Adding extra answers to the multiple choices answers (Ex):

The existence of extra answers in an activity means that the participant has thought beyond the given framework, which may refer to their critical reflection. The researcher gave 13 marks to a participant if they added one or more extra answers (Ex) to the existing multiple-choices answers.

3- Answering the activities' open questions (O-q): question5 and question6 - related to the Gibb's Cycle for both groups, experimental and control group1:

Question 5: After reading this article, what are the new strategies (if any exist) that you may follow in order to take care of.......?

Question 6: What are your best strategies or your action plan in order to take care of ...... for next lesson?

The researcher gave 25 as a mark for participants who answered both open questions (O-q). The reason behind this is that answering open questions may refer to the occurrence of a significant step in the process of reflective practice. A participant receives 12 marks if they answered only one of these open questions. This is the case even if the answers are not true or do not rely on the attached articles and videos.

4- The relation of the open question answers to the attached article and videos (R)

In terms of evaluating the extent to which the answers of the open questions are related to the activities attached article and videos (R), the researcher awarded participants 12 marks if they provided answers that related (R) to the topic presented in the attached article and videos.

Thus, the total of marks for all these factors is 100 and through this, we may reveal the extent to which a participant was engaged in an activity, and gain an estimation for their changes regarding their reflective practices.

For the purpose of ensuring the reliability of marking the questions of the activities, the researcher asked a Ph.D. colleague to assess all participants' answers in the first activity, and four samples of the rest of the activities. The percentage of the agreement was 100 per cent in

the following factors - answering the activities' open questions *(O.q)* and adding extra options to the multiple choice answers *(Ex)*, and 92 per cent in the case of the percentage of participants' answers of the activities *(P)*, and 87 per cent in the case of the extent to which the answers of the open questions are related to the activities' attached article and videos *(R)*. These show a high level of reliability of correcting and marking the questions of the activities.

The assessment of teachers' engagement (Facebook vs. Workbook)

The following table shows an example of a participant's work on Facebook activity, and then the marks that have been awarded it, and why, were explained.

n	Nickname	Q_A	Q_1	Q_2	Q_3	Q_5	Q_6	Q_B	Q_C
7	Omani-v	9	a b c d h l m	9	a c d x	a. Variation in teaching aids and methods of teaching with trying to present some sections that explain scientific experiments which cannot be done in the laboratory. b. Forming groups with different roles and give them the opportunity to prepare a lesson and make an explanation on the blackboard.	a. Diversification in teaching methods and aids and using stimulation programme to show some experiments. b. asking students to teach in some lessons, using an interactive white board and conducting entertaining competitions that include questions related to the lesson.	9	9 9 9 7
			Attempting to be closer to the student and find the way through which they might accept the information. This is because each student has a special mode and personal tendencies through which they can be motivated.						

This participant (Omani-v) answered all questions. Thus, the mark for the percentage of participants' answers of the activities *(P)*= 50. Furthermore, since he added extra options to the multiple choices answers *(Ex)*, then *(Ex)*=13. In addition, he answered both open questions *(O.q)*, Q5 and Q6. Therefore, he got 25 for *(O.q)* factor. Finally, the answers of the open questions *(O.q)* are related to the activities' attached article and videos *(R)*. This means that he got 12 for *(R)* factor. This participant got 100 as a total of marks for all these factors on this activity.

The following table summarises the assessed engagement by all participants in the experimental group in activities that used Facebook (Activities 1, 3, 5, 7, 9, 10 and 11). It also shows equivalent data for corresponding workbook activities of control group1.

The average engagement estimations of all participants for all activities (1, 3, 5, 7, 9, 10 and 11) of both groups (Experimental group: Facebook Vs. Control group1: Workbook)

Groups	Experimental group				The Total (100)	Control group1				The Total (100)
	P (50)	Ex (13)	O.q (25)	R (12)		P (50)	Ex (13)	O.q (25)	R (12)	
The Average	46.43	2.44	21.26	7.19	77.32	44.05	3.34	18.99	5.72	72.10

The previous table shows that the total average estimations of the engagement for the experimental group in these activities (1, 3, 5, 7, 9, 10 and 11) is slightly better than the total average estimations of the engagement of control group1 (Experimental group total average = 77.32 vs. Control group1 total average = 72.10).

The assessment of teachers' engagement (Twitter vs. Workbook)

The activities that were hosted on Twitter application were designed based on Kolb's cycle that has less steps than Gibb's cycle which was utilised by the Facebook activities. As a result, there are no open questions or attached videos. The engagement estimations for all participants in both groups, experimental and control group1, who have implemented the activities (2, 4, and 6) in Twitter vs. the Workbook, are shown in the following table:

The average engagement estimations of all participants for activities (2, 4, and 6) of both groups (Experimental group: Twitter Vs. Control group1: Workbook)

Groups	Experimental group		The Total	Control group1		The Total
	P (87)	Ex (13)		P (87)	Ex (13)	
The Average	84.13	0.84	85.0	82.37	2.43	85.1

This table, in general, shows that there are no clear differences in the average engagement's estimations of all participants in the activities (2, 4, and 6) between both groups whether using Twitter as a platform or using the Workbook. This may simply be because there are only two criteria in the Twitter activities, so the measure does not discriminate.

As a conclusion, the participants of the experimental group are slightly more engaged in the Facebook activities (1, 3, 5, 7, 10 and 11) compared to the participants of the control group1 (Experimental group: 77.32 vs. Control group1: 72.1). However, it is almost the same in the case of the activities on Twitter (2, 4 and 6). This may lead one to contend that the experimental group has practised reflection slightly more than the participants in the control

group1 when they employed Facebook. As a result, we can hypothesise that their improvement in reflective practice levels might be better than their counterpart in the control group1 where Facebook is the platform.

3- Evidence from standardised measures data

Third, and finally, for the purpose of comparing the growth over the intervention period in science teachers' reflective practices across the three groups (using mobile applications, workbook, diary cards), a parametric test: two-way repeated measures analysis of variance (two-way ANOVA test) was chosen.

It was decided that parametric methods should be applied if the data were found to be normally distributed, and non-parametric methods applied if the data were found to be not normally distributed. The normality test (Shapiro and Wilk test) was conducted on the pre-test responses of the Omani science teachers who participated in the main study. The researcher found that data were normally distributed.

Since the data were normally distributed, the decision to apply parametric tests for analysing these data was made. A two-way repeated measures analysis of variance (two-way ANOVA) test was chosen to examine if the growth over the intervention period in science teachers' reflective practices did differ significantly across the three groups.

It was found that the interaction effect between one between-subjects factor (condition: mobile applications, workbooks and diary cards) and the within-subject factor (time: pre and post) F-test was 1.07 with a p-value of 0.35. This means that the standardised measures data showed that the effect on test scores of a period of time spent on the training platform did not vary significantly across the three groups. In other words, the growth over the intervention period in science teachers' reflective practices did not differ significantly in any group.

Final Conclusion

Based on the previous sources of data, we can conclude that the experimental group programme had a positive impact on teachers' self-reported reflective practices. This was more than for the other two programmes (Control group1: using workbook and control group 2: using diary cards). However, the differences between the study groups in the enhancement of their reflective practice levels were not statistically significant.