# PRIMARY MATHEMATICS TEACHERS' VIEWS ABOUT USING ONLINE ASSESSMENT IN SAUDI ARABIA

**A thesis submitted in partial fulfilment of the requirements for the degree of Master of Education Assessment and Evaluation**


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## ABSTRACT

This study has explored the attitudes of mathematics teachers in the Kingdom of Saudi Arabia (KSA) towards the use of online assessment, with a view towards understanding how these attitudes may influence the implementation of online assessment in schools. Semi-structured interviews were conducted among six female teachers in Saudi governmental, private and Islamic schools. A thematic analysis was performed on interviews conducted with the six teachers to discover their views regarding online assessment and how those views influence their decisions whether or not to implement online assessment practices in their mathematics classrooms. The research includes a literature review that demonstrates the importance of assessment in education, enables an understanding of the background of online assessment and use of technology in Saudi Arabia (KSA). The findings from this study indicate that teachers feel somewhat ambivalent about the introduction of online assessment in mathematics. This study has revealed that there is some enthusiasm about the prospect of using information and communication technology. However, there is also hesitancy and a sense of the need to progress cautiously due to beliefs about some obstacles of using online assessment, as an example, policies of schools, limits of resources and budget, lack of teacher training and problems with managing the time within the classroom to practise online assessment. This study indicates that online assessment of mathematics in KSA requires a review of individual school policies prior to implementing online assessment, including management and the availability of time in the classroom for online practise. It is also important to train teachers to be able to assist students online, as well as to set the specific budget with consideration of the technology capabilities of every school.

# CHAPTER 1: INTRODUCTION

## 1.1. The impetus for research study

Motivation for this study arose primarily out of personal experience growing up and being educated in Saudi Arabia. After my undergraduate degree, I secured a position as a mathematics teacher at a primary school in Madinah, Saudi Arabia. Based on my personal experience, I am aware of a range of opportunities and challenges in school education in Saudi Arabia. There are advantages of teaching in Saudi Arabia, such as creative pedagogy, flexibility in teaching and the ability to use entertainment to make education interesting for students in the classroom. At the same time, there are challenges, such as the heavy workload for teachers and some limitations based on school policy.

Teaching at a primary school in Saudi Arabia is not easy. It involves preparation, teaching and marking for several classes of up to 50 students. Each class includes approximately 10% of students with disabilities, such as hearing impairment. Special assistance has been required for teaching these disabled students as well as for academic assessment where special education with proper facilitation and training has not been mainstreamed in the education sector.

Through necessity, I brought schoolwork home every day to mark student assignments and prepare for classes. Consequently, rather than regarding my teaching as an interesting vocation, I began losing motivation and became lethargic and frustrated. I saw that students needed a more individualised approach, and came to realise that the use of technology in education could be beneficial for all students, including the hearing impaired. Thus, I came to believe that using online assessment in mathematics in primary school could influence students in a positive way, especially those with

disabilities. While teachers in interviews did not mention this aspect, the literature review of the research provides information on the importance of the paying attention to the diversification of education in Saudi Arabia. Online assessment is one of the tools that can help to make the educational process more suitable for students with disabilities.

## 1.2. Structure of the thesis

This thesis contains six chapters. The first chapter is an introduction to the study. The chapter provides a background of the study, research questions, research rationale and objectives, significance, and limitations of the study. Chapter 2 presents a review of the literature and provides a thorough background by reviewing the relevant literature related to assessment in education. Definitions of assessment types in education are provided, which include diagnostic assessment, summative assessment, and the preferred method recommended in the study: formative assessment. Chapter 2 also explains the use of effective feedback to enhance student learning and discusses the impact of teacher views on assessment. Chapter 3 explores the methodology used to conduct the research and the techniques used to collect and analyse the data. Chapter 4 contains the findings of the research study. Chapter 5 explains the theoretical framework used to understand the findings, followed by the final Chapter 6, which provides the conclusion of this study and recommendations for further research.

## 1.3. Background

### 1.3.1 Basic overview of education schooling in Saudi Arabia

Schooling in Saudi Arabia is divided into primary, intermediate and secondary schools. For religious and cultural reasons, boys and girls are educated separately at all levels.

Moreover, girls are taught by female teachers and boys by male teachers, due to the same cultural sensitivities. Schools are divided by type: government schools, Islamic (religious) schools, and private schools. Educational policy is driven by the Kingdom of Saudi Arabia's Ministry of Education (MOE), which is in charge of all aspects of the sector. All three types of schools fall under the purview of the Ministry, and are governed by the district they are based in.

The Saudi Ministry of Education (2017) has outlined goals for educational development as part of the country's Landmark Vision 2030, which is a broad-based plan to reduce the country's dependence on oil, diversify economy, and improve the public sector services for all citizens.

The plan was designed in order to rebuild the system of education with consideration of modern requirements and to align with market needs. The modified education system is expected to lead Saudi Arabia to become the country with the highest quality of services in the region. According to this plan, the government will keep investing in education in general and in order to implement modern approaches. Thus, current paper on online assessment is relevant to the Landmark Vision 2030.

The key aims identified by the ministry are as follows:

- In order to put goals and policy into action, it's important to develop goals, policy, and philosophy for educational programs.
- It's important to develop methodologies for teaching that aim to benefit learners not only teachers. The developed methodologies should develop skills, personality, improve confidence, and motivate students to be creative.
- Schools environment should be preferred, attractive, and motivating, as well as it should be connected with the integrated and supportive system of services.

- Students with any category of disabilities should be provided with comprehensive education and to be supported.
- Pre-primary education opportunities should be expanded and it should be linked with primary school educational system. (MOE, 2018).

The ultimate aim of the Ministry of Education as part of Landmark Vision 2030 is to improve the way education meets the needs of the future, such that the students emerging from the education system are well-placed to fit into the new economy that the country hopes to create.

According to the general civil service regulations laid out by the Ministry of Education, in order to be a teacher at any level in the country, the minimum required qualification is a four-year Bachelor's degree. However, once teachers begin teaching, they are provided with little in the way of further training and education in teaching content and pedagogy. While some training is offered, it is not adequate nor is it in step with evolving changes in methods of teaching (Alghamdi & Li, 2011).

Aldabas (2015) described the learning environment in Saudi Arabia schools as not inclusive for the adoption of new technologies, and thus the implementation of technologies in learning and assessment is challenging. The author recommends when implementing new technology tools in the learning and assessment processes in Saudi Arabia to consider if teachers have access and are familiar with the technologies that are expected to be used.

Technology models are applicable in the education system of Saudi Arabia. However, the applicability is limited by technical equipment in some schools in Saudi Arabia. It's also important to consider that future plans of Ministry of Education in Saudi Arabia are related to the supplying technical educational institutes in the kingdom. There are

two main limitations when implementing technology solutions in Saudi Arabia schools: current lack of technical equipment in some schools and lack of technical skills by teachers. While the first limitation is planned to be fixed within the nearest future due to the governmental investments to education, technical training by teachers is still not solved (Alharbi & Drew, 2014). Alnahdi's (2014) study involving 158 Saudi Teachers found that teachers in Saudi Arabia lacked the necessary knowledge and skills to be able to assess their students effectively. So, there are issues with assessment more generally, not just online assessment, and this is important. The author stated that the approaches to the assessment in Saudi Arabia schools have to be modified. The modifications must include training for teachers on different types of assessment as well as the implementation of modern types of assessment.

In recent years, in an attempt to align with the necessities of the Kingdom's Landmark Vision 2030, there has been some interest on the part of the government into providing greater professional development assistance to teachers. As a result, the Ministry of Education recently announced plans to increase the minimum required standards for teachers from a Bachelor's degree to a Masters' degree and add additional teacher in-service training and professional development through 1-2 month-long short courses (Nurunnabi, 2017).

### 1.3.2. Types of Schools in KSA

The Saudi Government schools, private schools and the Islamic schools highly differ in their courses, teaching styles and the way in which they manage their students. The government schools have a large number of students with fewer teachers (Salehi-Isfahani, Hassine, & Assaad, 2014). While the Saudi educational system has developed well and the overall number of teachers has increased, Alnahdi (2014) states that there

is still a lack of "high-quality teachers". Therefore, it is not possible for the teachers in government schools to give equal attention to each student. The government schools have a moderate teaching style and does not use the latest methods of assessment for learning with students, in comparison with the private schools, which tend to be more advanced in pedagogy programs (Buening, & Mosley, 2014; Russ, 2017). The government schools mainly use the traditional methods of knowledge transfer with less use of the latest digital technologies, such as online assessment (Salehi-Isfahani et al., 2014). In contrast, the private schools provide modern education facilities and ensure that teachers are able to give individual attention to each of the students. The private schools emphasise the use of the latest digital technologies in the process of learning and assessment of the students (Salehi-Isfahani et al., 2014). They give higher emphasis to ensuring that the students are capable of successfully completing their assignments and arrange special training for those requiring further help.

There are many religious specific schools in Saudi Arabia that mainly focus on training their students about Islam. The main objective of Islamic schools is to make their students knowledgeable about the beliefs, values, principles and norms of Islam. The schools ensure that the students are aware of and strictly follow the Islamic principles in their daily life (Berkey, 2014). The author recommends modifying teaching approaches by moving away from traditional methods of Saudi Arabia where the main focus is on memorization. Modified approaches should encourage students to analyses and find ways of solving problems.

### 1.3.3. Technology equipment in Saudi Arabia schools

While technology implementation just started in Saudi schools, the perception of the idea and the first steps of implementing technology in schools can be considered as an

advantage. As with much of the rest of the world, Information and Communications Technology (ICT) usage in the Kingdom of Saudi Arabia has skyrocketed in recent years (Almalki, & Williams, 2012). More recent research by Albugarni and Ahmed (2015) shows that ICT has been successfully implemented in Saudi Arabia in the education system and has had massive governmental investments in this field.

According to the government of Saudi Arabia's Ministry of Communication and Information Technology, the total number of mobile phone subscriptions in the Kingdom reached approximately 44.04 million by the end of the third quarter of 2017. The number of internet users was also high, reaching about 24.5 million with a population penetration of 77% in the same time period. For reference, the total population of the Kingdom of Saudi Arabia was 31.8 million in 2016 (General Authority of Statistics, 2016). Al-Fahad (2009) demonstrated the advantages in Saudi Arabia of using technology in education in recent research on the role of teaching and learning using personal mobile devices, such as hand-held tablets, PDAs, and smartphones. Teaching and learning using mobile technology, sometimes referred to as m-learning, differs slightly from e-learning, which mainly relies on computers in the classroom, whereas the 'mobile' aspect enables learner mobility to engage with education anytime or place while using digital devises that are 'mobile'. The author concluded that, due to the ease of access to mobile technology and the benefits to improvement in education, mobile learning has huge potential in Saudi Arabia schools.

Mobile learning is expected to make the process of study more comfortable for teachers and students which makes significant differences in teaching approaches. Mobile learning leads to the huge potential and great learning perspectives, as well as to new vision and requirements to teaching practices. Mobiles can be used in learning

processes in formal and informal communication and combine indoor and outdoor study and assessment practices (Kukulska-Hulme, 2009).

Mobile learning should be suitable for performing the assignments by students and to assist these assignments by teachers. Because mobile devices are personal items, teachers and students are already familiar with their functions. Thus, there is no need for additional technical education for teachers and students when implementing mobile learning (Kukulska-Hulme, 2007).

There are not enough definitive statistics to accurately state the number of personal computers, laptops, tablets and smartphones that are being used by students in classrooms across Saudi Arabia. However, given the high level of penetration of internet access amongst the Saudi Arabian population, it is likely that a high number of students use a device with internet access, whether it is at school or at home. According to the report of the Communication and Information Technology Commission (2009), computer penetration among personal users in Saudi Arabia increased from 2007 to 2009 by 10% (from 43% to 53%). Also, based on the report data, 79% of colleges in Saudi Arabia are equipped with laptops. which can be used by both: teachers and students. Students use laptops for learning outcomes, while teachers can use to control the educational process by assessment and preparing the learning materials.

Moreover, many teachers also have access to the same technology. Many teaching tools are freely available online and some others are available for a nominal fee. As an example, local software company, Semanoor (http://www.semanoor.com.sa/Ar/index.html#about), provides teachers with electronic versions for all kindergarten to year 12 level private and public schools, providing online library and other tools that enable e-learning for teachers and

students in KSA (Al-Asmari & Khna, 2014). While most Saudi teachers in the cities and urban areas can access these programs, teachers in remote areas often do not have internet service and are unable to use technology in the same way (Mulhim, 2014). Moreover, while Saudi teachers have begun to access learning tools and programs online, online assessment has not yet been widely accepted in general school curricula or teacher practice.

### 1.4. Research questions

The main research questions guiding this study are:

- What are Saudi Arabian primary school teachers' views about online assessment?
- How do these views influence their decisions whether or not to implement online assessment practices in their mathematics classrooms?

This study explores Saudi teachers' views and experiences to identify the current state of online assessment issues involving schools, schoolteachers, school management, and other stakeholders, school management, and students, parents and government. Currently, there is limited usage of online assessment in Saudi Arabian schools. However, the proliferation of technology has meant that increasing numbers of teachers are now expected to use technology in evaluation practice. Additional, up to date research on teachers' perceptions of online assessment will help to determine what barriers and obstacles there may be to implementing online assessment in mathematics in primary schools in KSA. Based on the information gathered from teachers during this research it would be possible to propose recommendations that will help to improve the educational system in primary schools in KSA.

The aims of this study are, firstly, to determine what the views of teachers are concerning using online assessment and, secondly, identify how this influences their decision to implement, or not implement, online assessment in mathematics. This is an area where there has been limited research. Findings from this study will help provide insight into contextual factors hindering online assessment and lead to recommendations as to how these hindrances might be overcome.

## 1.5. Research rationale and objectives

The rationale for this research arises from the need to advance current understanding regarding the use of online assessments in mathematics in Saudi Arabian schools. In addition, there is a corresponding need to apply the best methods of implementing online assessment in schools to help in achieving the education goals of the KSA Landmark Vision 2030. Fulfilling these two needs forms the central purpose and reason for undertaking the research. Hence, the study will focus on the use of online tools as assessment for learning, with the objective being to identify enablers and barriers to successful implementation of online assessment and make appropriate recommendations as to how these might be overcome.

## 1.5. Significance of the study

This study will have a twofold significance.

Firstly, it will address two significant gaps in the literature:

1) A lack of research regarding teachers' beliefs about online assessments
2) A lack of research about online assessments in mathematics in primary schools in Saudi Arabia.

Secondly, by proposing recommendations about overcoming the barriers, it will contribute to the knowledge of best methods for teachers in using online assessments in their teaching practices.

## 1.6. Limitations of the study

The limitations of this study include, firstly, that there are some cultural restrictions in Saudi Arabia, based on religion, heritage, rules, norms, and values of society, that are essential for Saudi citizens and visitors to accept and act in accordance with. For example, in the education system, only female teachers can teach and interact with female pupils and, likewise, male students are only taught by male teachers. Thus, students and education staff are segregated by gender in different schools or classroom settings. As the only researcher in this study, and being female, I was only allowed access to female schools and only female teachers were able to be interviewed for the study. Thus, any insight that would have been gained from male teachers teaching all-male classrooms could not be included in this study. This limitation is important to consider, as interviews with male teachers may provide a valuable perspective and would merit exploration and further research along similar lines to this study.

Secondly, the sample chosen was restricted to only six teachers, although care was taken to ensure that government, private and Islamic schools were all represented. However, they were not represented equally as there were more government school teachers than others, which does however reflect the greater numbers of government schools compared with private or religious schools.

Thirdly, there was also a geographic restriction as the schools were all located in Madinah City. It is possible that teachers working in different districts, with varying aspects of culture and standards of living conditions will have differing experiences.

Teachers in schools following different rules and policies due to belonging to another district, may have views that are different from the ones presented by the teachers in this study.

Other limitations are related to the selected research methodology. Interviewing as a method for qualitative research provides a wide range of information and has advantages over some other methods. However, if other questions were asked, the research might have produced different results as well as elicited more information. Also, the research was limited by focusing on only primary schools, whereas further research could include or focus on other levels of education.

# CHAPTER 2: LITERATURE REVIEW

## 2.1. Introduction

The first chapter has established the impetus for this study, included the context and background, presented the importance and rationale of the study, and identified the research questions. This next chapter presents a review of the relevant literature on assessment in education and explores previous and current academic research, giving an overview of the area of study and covering the prevailing theories and methodologies on the subject. This literature review will recognise that there is a sizeable body of research on the importance of assessment in education and, likewise, the discourse concerning online methods of assessment has also grown rapidly with the advent of greater technology uses in the classroom. The review will focus on these two main themes in the literature – assessment methods and information technology – as they have numerous implications for the advancement of pedagogy in Saudi Arabia and, therefore, are central to the aims of my research.

## 2.2. Assessment in education

For assessment to be effective, it is important that pupils receive timely and effective feedback (Crawford, 2012). Assessment in education involves the use of student work to track progress, set targets, inform planning, and enable teachers to ensure that all students make optimal progress in their learning. Such data can be acquired in a number of ways, such as questioning, observation, marking of pupils' work, and formal testing. Assessment may also include pupils evaluating their own work and comparing it with their goals (self- assessment) or evaluating one another's work (peer assessment) (Gikandi, Morrow, & Davis & Wiliam, 2011).

According to Bennett (2011), the information gathered from assessment can be used in a variety of ways. Teachers make use of assessment in daily classroom practice to identify areas of strength and areas in which pupils may require additional support and to inform lesson planning. Gardner (2012) identifies how school leaders make use of assessment data to monitor performance throughout the school, and target interventions effectively. Thus, many authors recognise that assessment plays an important role in everyday classroom practice and is a vital tool in ensuring an effective teaching and learning cycle. However, in a wider context, Polesel, Rice and Dulfer, 2014 contend that assessment is used to ensure that schools are accountable to key stakeholders. According to Haydn (2012), assessment has three main purposes. The first is to progress the learning, the second is to track and report on pupils' progress, and the third is to hold schools accountable to parents, the government and other stakeholders, school management, and students, parents and government.

According to William (2011), assessment is crucial for helping teachers and students as it provides continuous information about the level of understanding of the students, and also helps teachers to refine or change their teaching methods accordingly. Providing feedback, however, can be an enormously time-consuming process for the teachers (Nicol & Macfarlane-Dick, 2006). It has been suggested by a number of authors that a possible way forward to reduce the teacher workload associated with assessment is to use online assessment tasks (Sellen, 2016)

Krause et al. (2015) in the research on the competency-based education stated that online assessment saves time by students and teachers. The main factor of time-saving is in the specific focus of online assessment which demonstrates specific knowledge or lack of the knowledge in difference with traditional assessment models, when teacher

and student may go around the topic for a long time till it would be clear how to correct assist a student.

Tynan et al. (2015) when evaluating teachers' workload, concluded that using online assessment reduces the time teachers spend assisting traditional assignments. At the same time, online assessment doesn't demonstrate a lower quality of control or lower learning outcomes. Thus, authors recommend using online assessment as a solution for teaching overloads.

Assessment tasks that are online provide students with instantaneous feedback and promote student engagement, thereby reducing the workload for teachers in marking assignments by supplementing the direct feedback students need for their learning progress (Hepplestone, Holden, Irwin, Parkin, & Thorpe, 2011). According to Sorensen (2013), online assessment improves the process of assessment and, in addition, it saves the time as teacher is able to provide immediate feedback, save all records, and have easy access to references.

An example of the currenty available online assessment is, Khan academy (2018) which delivers efficiently maths related assessment tasks and many other subjects, all of which can be accessed by students, teachers, and parents. Khan Academy is an online hub that provides students with the opportunity to practise a range of simple to complex math problems online. The platform provides organised folders for each grade--ranging from Grade 1 to Grade 8, and different other modules to practice.

Zaghlol's (2014) study of online assessment and faculty staff views in 34 universities in several Arab countries (Saudi Arabia, Egypt, Jordon, United Arab Emirate, Kuwait and Oman) found that 79% of the staff were satisfied with online assessment in the university context.

If used effectively, online assessment tools may aid the teacher in the identification of student needs. Assessment functions help in "closing the gap" between the level of knowledge in the topic that is required for successful learning outcomes and the student's current level. Thus, the teacher is able to identify students needing additional attention to ensure they do not fall behind (Jordan & Mitchell 2009).

As assessment is regarded as an essential element of education, almost all online learning management programs have assessment support, for example, to evaluate a test (Sorensen, 2003). However, Nisbet and Warren (2000) state that teacher beliefs about information and communication technology (ICT) and online learning have a significant impact on classroom practice with respect to teaching and assessment. The authors suggest that teachers who lack confidence in use of technology are often reluctant to engage with or to use online education methods, which can have implications for their students. This factor could be particularly relevant to developing countries, or in remote area classrooms, where there may be limited availability of ICT equipment or access to the Internet.

There are different policies in educational systems in different countries. The difference can affect the ways in which teachers implement and document assessment. For example, in Australia, an emphasis on accountability, exemplified by the National Assessment Program – Literacy and Numeracy (NAPLAN), has led to concerns that high-stakes national testing is significantly influencing classroom teaching (Lingard & Sellar, 2013; Swain, 2014). In particular, the emphasis on accountability has led to teachers becoming highly aware of the need for assessment to be documented, and for clear evidence of assessment to be available in the form of work samples and teacher feedback (Polesel, Rice, & Dulfer, 2014).

Christensen, Carver, VanDeZande, & Lazarus (2011) suggest that the assessment system should be provided to schools on the governmental level of control and should include differentiation for students with disabilities. They propose that students with disabilities should have individualized education program (IEP) applied to their assessment. IEP includes differentiated assignments and assessment for students with different types of disabilities. One of the moral obligations for schools is to make education inclusive, easy to access, and equitable for students with disabilities. In cases where teachers are limited by timeframes or needing specialized materials for students with disabilities, e-learning can be a recommended solution. Kent, (2015) points out the value of e-learning (and online assessment) for students with disabilities who may perform individualized tasks from home, as well as they can be assisted and instructed by teachers in online mode (. A case study on e-learning in Saudi Arabia (Sait Ali, & Al-Tawil, 2003) also recommends the use of e-learning and electronic assessment for students with disabilities. While the research in my study does not have a specific focus on students with disabilities, there is a growing body of research on education that seeks to address the special needs of disabled students. Therefore, consideration of the moral and ethical principles that are needed in society to ensure equitable access to learning for everyone is vital and should be part of any discourse on education. According to the literature review on the role of assessment, all authors agree with the importance of assessment in the learning process. While every author highlights different benefits of using different types of assessment, most of them recommend selecting the type of assessment used in consideration of ethical norms, principles, equipment and technical background of teachers and students.

## 2.2. Types of assessment

Dumit (2012) describes three types of assessment that are most often used in education: diagnostic, summative and formative. Diagnostic assessment helps teachers to understand what the student has already absorbed or learned and identifies the entry point (Dumit, 2012; Tymms, 2013). This is usually undertaken at the beginning of a course of study so that the teacher has an understanding of where the student is starting from. In contrast, summative assessments, take place at the end of a unit of education, such as mid-semester or end of semester, to measure students' progress (Cremin, 2014). The third method described by Dumit (2012) is formative assessment, which is carried out through the teaching cycle, and is an integral part of day-to-day classroom practice (Haydn, 2012). Garrison and Ehringhaus (2007, p. 2-3) defined formative assessment as "part of the instructional process. When incorporated into classroom practice, it provides the information needed to adjust teaching and learning while they are happening. In this sense, formative assessment informs both teachers and students about student understanding at a point when timely adjustments can be made".

### 2.2.1. Diagnostic Assessment

Diagnostic assessment is used to determine what pupils already know about that topic, and to activate their prior knowledge (Kemp & Scaife, 2012). In many education systems, a diagnostic assessment is carried out when a child first enters formal education; this forms the basis on which their progress is tracked throughout their school career. In addition, diagnostic assessments are often carried out following transition; for example, when a pupil moves from primary to secondary school (Harrison, 2011). This is particularly important in a subject such as mathematics, where concepts are re-visited throughout a pupil's schooling, at increasingly advanced levels.

Diagnostic assessment allows the teacher to ensure that all pupils have the necessary prior knowledge from which to progress to the next level (Isabwe, 2012).

### 2.2.2. Summative Assessment

Summative assessment usually comes at the end of a course of study as it helps the teacher understand what a student has learned from the course and aids in the teacher deciding whether the student should graduate to the next level or not (Dumit, 2012). Summative assessment may take the form of national testing, such as NAPLAN, or external examinations at the end of secondary school. Teachers may also use summative assessment at the end of a lesson, unit or topic, to inform future planning (Haydn, 2012). Teachers assess pupils' progress and determine whether the intended goals have been achieved or whether any aspects of the topic need to be re-visited (Haydn, 2012).

Summative assessment may take the form of formal testing; however, teachers may also use other types of tasks, such as oral presentations or essays, final exams, state tests, college entrance exams, final performances, and term papers (Dixson & Worrell, 2016). There are many criticisms in the literature of the method of formal summative assessment, such as tests or exams, as it is essentially a 'snapshot' of a child's attainment and relies heavily on their performance at a specific point in time (Daradoumis, Bassi, Xhafa, & Caballé, 2013). A child's performance in summative assessment may be affected by extraneous factors that are beyond the school's control; for example, illness, or family problems. For this reason, many in the education profession regard the summative method as unreliable, and prefer the formative assessment as a more reliable measure of children's progress (Haydn, 2012; Polesel, Rice, & Dulfer, 2014). Diagnostic and summative assessments lend themselves readily to the use of Information and Communications Technology as an assessment tool.

These two types of assessment can be structured in the form of a formal test or examination which can be administered online and marked automatically.

### 2.2.3. Formative Assessment or Assessment for Learning (AfL)

or sometimes referred to as Assessment for Learning (AfL), is conducted throughout a course of study, in both formal and informal ways, to evaluate continuously the understanding of the students in the subject at hand (Dumit, 2012).

It enables the teacher to assess students' progress and to set achievable learning goals, give feedback and inform future teaching (Vonderwell & Boboc, 2013). It is an ongoing process, which enables teachers to continually refine and develop their teaching to meet student needs (Australian Capital Territory Government, 2011). AfL is as important as summative assessment, since it informs the ongoing learning cycle and allows adaptations to be made to enhance student performance (Andersson & Palm, 2017), and it has several distinctive characteristics. It is a process of gathering information about pupil progress during the teaching cycle (Andersson & Palm, 2017). The information gathered from the assessment is used by teachers to progress student learning (Harrison, 2011; Wiliam, 2011). AfL uses open-ended tasks to challenge pupils and to encourage the use of higher-order thinking skills (Trauth-Nare & Buck, 2011).

According to Brown, Harris, & Harnett (2012), however, a pitfall of AfL is that there is a tendency among teachers to focus feedback on pupils' current standard, without giving them information related to how to progress their learning. Therefore, a crucial component of AfL is feedback which is clearly linked to learning objectives, and which informs students about how to progress their learning in relation to those criteria. To achieve this requires a combination of "success feedback", informing the pupil about their current level of achievement; and "intervention feedback", according to Harrison

(2011), giving them guidance as to how to progress their learning to the next level (. In this way, feedback can be used by students to enhance their learning and achievement; it can also be used by teachers to inform planning and allow them to align their teaching as closely as possible to the needs of their learners (Andersson & Palm, 2017).

A further feature of AfL is that, when used effectively, it can empower students as self-regulated learners, improving their motivation and self-esteem (Andersson & Palm, 2017). In order to accomplish this, it is important that the student has a clearly defined goal to aim for, so they can compare their current standard with that required to meet their goal. It is then important that they have access to feedback which allows them to engage in appropriate action in order to close that gap (Bennett, 2011). AfL provides students with clear goals and assessment criteria, as well as facilitates self-assessment and, hence, it helps students become self-regulated learners (Andersson & Palm, 2017).

In setting an AfL task, therefore, there are certain key principles, as outlined by Bozarth, (2010), that need to be followed in order to ensure success (). Firstly, the task itself must be of high quality and must engage the students. The task should also, in itself, develop learning and require students to challenge themselves to move out of their 'comfort zones' (Wiliam, 2011). AfL can take the form of quick activities, which can be incorporated into any phase of a lesson. For example, 'Think, Pair, Share' involves the teacher posing a question and giving students time to think about it individually, then discuss with a partner and refine their ideas, which are then shared with the rest of the class (Kaddoura, 2013). Posters, presentations and leaflets are also widely used in AfL, since these enable students to express their ideas and knowledge in an open-ended and creative manner (Wiliam, 2011). Concept maps, sometimes referred to as mind-maps, are also a valuable AfL tool, since they enable students to make links between

different elements of their learning, thus promoting higher order thinking skills (Wiliam, 2011). Teacher observation and consultation, checklists and anecdotal notes are also tools used by teachers for AfL tasks (Briggs, Woodfield, Swatton, & Martin, 2008; Swain, 2014).

A second key principle of AfL is that students must be given clear information about the assessment criteria. Students are often given a set of 'success criteria' stating what they need to do to achieve a particular grade or level: these are highly specific to the task in hand (Heritage, 2010). According to Heritage (2010), success criteria can be linked to either knowledge, skills or sometimes both. Thirdly, feedback must be of good quality and must be clearly linked to the success criteria; it must give students clear information about the steps students should take in order to reach the next grade or level. Feedback should be positive and should have clarity; students should also be given the opportunity to speak to teachers about their feedback in order to query or clarify as necessary (Wiliam, 2011).

The fourth, and possibly most crucial element of AfL is that, following feedback, students should be given the opportunity to improve their work, after which it is re-marked and given a new grade. This allows students to clearly see immediate progress in their learning, and to know whether the actions they have taken in closing the gap between their learning and the desired goals have been successful (Moradmand, Datta, & Oakley, 2013).

In giving initial feedback for an AfL task, teachers often do not give a grade. Wiliam (2011) explains this as a strategy for preventing the tendency among students to focus purely on the grade they have been awarded and to ignore the feedback. A student who has achieved or exceeded their goal may be tempted to 'rest on their laurels' rather than

work towards further improvement, while a student who has fallen short of their goal may become disillusioned and be inclined to give up (Wiliam, 2011). By withholding the grade until the final mark is awarded, students are encouraged to focus on and act on the feedback they have been given (Brown, Harris, & Harnett, 2012).

Although AfL is an extremely powerful tool for teaching and learning, it has one very significant drawback, the high workload involved, particularly with regard to marking and feedback (Ming, 2005). Some innovative solutions have been developed by teachers to reduce the workload; for example, the use of 'traffic light' marking (Lee, Feldman, & Beatty, 2012). This method uses colour-coding: green where work is correct; orange where the work requires minor corrections or further development; and red where work is incorrect. However, extensive written feedback is also needed to ensure that students are clear as to what they need to do in order to improve (Crawford, 2012).

In the literature on assessment in mathematics, researchers point to an important component of AfL being that teachers are able to gain insight into students' thought processes. For example, if a student is carrying out a multiplication task and getting incorrect answers, it is important that the teacher is able to observe the process by which they are arriving at the incorrect answer in order to move their learning forward (Beatty & Gerace, 2009). Therefore, studies of AfL point to the need for tasks to be designed in such a way as to allow the teacher to give continual feedback on the student's progress and to use guidance regularly to overcome these learning difficulties (Bennett, 2011). Bennett states that AfL in mathematics is therefore seen as much more effective than the summative method where, at the end of a unit of instruction or semester examination, a student's final marks may be poor, due to them receiving limited

feedback, and the results will become a permanent part of their academic record. This theme in the research that Beatty and Gerace, (2009) use to emphasise the need for continual feedback in mathematics teaching leads to the next central idea about how to efficiently and effectively provide AfL to students within the practicalities of teachers' heavy workloads and limitations of classroom teaching. Recent research now points to the importance of ICT, e-learning, and e-assessment that have emerged as modern facilitators to support teachers in implementing formative assessment (Baleni, Zwelijongile & Gaylard, 2015; Gikandi, Morrow& Davis, 2011).

### 2.3. Online Assessment (Electronic assessment)

The use of online assessment in education has been widely accepted as an integral part of today's 'digital age' education system where technology is no longer considered as a scarce resource (Gikandi, Morrow & Davis, 2011; Isabwe, 2012). Electronic assessment (e-assessment) is a particularly effective way of using technology to assess students' capability to complete a particular task and these are mostly in the form of quizzes, e-submission and peer assessment (Gil de Zúñiga, Puig-i-Abril & Rojas, 2009; Dr Zaghlol, 2014). Unfortunately, not all schools are able to provide every student with a personal computer, even though there is significant growth in the number of computers available in schools in most developed countries (Islam & Gronlund, 2016). Lack of computerisation is obviously a challenge for development of digital education and assessment; however, some authors have suggested that the growth in ownership of personal, mobile devices offers tremendous scope for enabling students to engage in online learning and assessment in conjunction with parallel development of more student-centred and self-directed learning.

Along with the growing interest in using online assessment in a wide range of educational settings, research in this area has also been growing rapidly (Baleni, Zwelijongile & Gaylard, 2015; Gikandi, Morrow& Davis, 2011). Many authors have pointed to a key advantage of e-assessment for students being that it provides immediate feedback. Immediate feedback enables students to learn about their mistakes and about how to correct them through self-directed learning and engagement with digital media. Furthermore, online assessment allows students to make many attempts until they arrive at the correct answer, which helps them to determine their own learning path (Redecker & Johannessen, 2013). Online assessment also encourages students to take part in the evaluation of their own learning so they will be more responsible and have a degree of ownership of their learning process. According to research by Guàrdia, Crisp and Alsina (2016), this ownership of learning developed through online assessment is of tremendous benefit and critical for students' success .

While the use of online assessment is mostly focused on assessing students' learning achievement, it is also beneficial for the teacher to gain feedback from students regarding their strategies and instruction preferences (Clements & Cord, 2013). As teacher workload and large class sizes are an important issue for many countries, including Saudi Arabia (Almalki, & Williams, 2012; Parkinson, 2017), there is much research that argues the use of online assessment can significantly aid in reducing the heavy burden of marking assignments, giving feedback, and administrative work by teachers (Gikandi, Morrow, & Davis, 2011; Tynan, & Lamont-Mills, 2015).

In addition, Daradoumis, Bassi, Xhafa and Caballé, (2013) state that the development of Virtual Learning Environments (VLEs) has made it much more practical for teachers to incorporate online assessment into their day-to-day classroom practice. VLEs allow

students to upload work that enables teachers to mark and provide feedback. In addition, teachers can create activities, such as quizzes, which can be marked electronically, giving students instant feedback. Such activities are particularly useful in diagnostic and summative assessment, or in giving a quick 'progress check' as part of ongoing formative assessment. Furthermore, VLEs and online methods allow teachers to develop discussion forums enabling peer assessment and feedback (Daradoumis, Bassi, Xhafa & Caballé, 2013).

There are a number of highly successful platforms that can be used to deliver effective online AfL. For example, MyMaths is an online platform which can be used to deliver and mark a range of assessment tasks, giving pupils and teachers instant feedback about pupil progress and how to advance pupils' learning (Moradmand, Datta & Oakley, 2013). However, there are limitations in that MyMaths is a United Kingdom (UK)-based application; it is specifically designed for delivery of the UK maths curriculum and is currently only available in English. This means that MyMaths is at this stage useless in many other countries where they do not have access to it or where English is not the language of instruction in maths. However, there are other online assessment tools available for teachers all over the world. As an example, Pépite is one freely available online assessment tool with planning support (Ball et al., 2018). Another is A2I online tool that can be used by teachers to evaluate students' background on a topic (Ingebrand & Connor, 2016). Khan Academy is another online platform which provides assessment tools covering all age ranges and subjects, including mathematics (Khan Academy, 2017), while further options for online tools are becoming more available and in use more widely.

There are a number of challenges to overcome in delivering effective AfL through online platforms. In particular, AfL requires the use of open-ended tasks rather than closed questions. However, these are less easy to mark using automated systems. In addition, the type of personalised feedback that is necessary to deliver effective AfL is also difficult to achieve using automatic systems (Lee, Feldman & Beatty, 2012). However, many VLEs now include facilities that allow teachers to mark and annotate pupils' work online using comments, which is considerably faster and more convenient than conventional marking. It also enables a dialogue to be established with the pupil, in which the teacher gives feedback and the pupil responds to that feedback.

An advantage of online assessment platforms in mathematics learning, such as MyMaths and Khan Academy, is that pupils can progress at different rates. Khan Academy is responsive to pupils' learning, so that when a pupil has grasped a concept (measurement, for example, by getting a certain number or proportion of questions correct) it will move them on to a more advanced level. As well as creating personalised learning pathways for each pupil, which would be extremely time-consuming for a teacher to do manually, this type of progression helps children to develop as independent, self-regulated learners (Thompson, 2011). However, critics of Khan Academy, including Tucker (2011) and Light and Pierson (2014), are concerned that overuse could lead to a standardisation of teaching, and that the use of such online platforms could lead to the de-professionalisation of teachers.

Reasons for teachers' de-professionalisation were discussed by Olakanmi (2016). The author states that online tools, such as Khan Academy that provide materials and assessment tools, lead to the role of teachers being minimised. A critical point is that the teachers' role, which is giving knowledge and evaluating student performance, is

done by the Khan Academy website. Therefore, to maintain the role of the teacher and to gain knowledge and benefits from the online tools, the author recommends using the 'flip learning model', advocated by Olakanmi (2016), where students first acquire the information by themselves and then discuss their findings with the teacher in a classroom. For this purpose, students can use a mobile device to access information online any place they feel comfortable, rather than being restricted to the classroom.

### 2.3.1. Online Assessment Using Mobile Technology

Mobile technologies, such as smartphones, PDAs, laptops, and tablets, offer a potentially useful tool for the delivery of effective online assessment or AfL. For example, the use of iPads for peer assessment has been found to be highly effective, both in improving the quality of feedback to students, and in enhancing student engagement (Isabwe, 2012). Mobile applications allow teachers to create quizzes and other tasks which can be tackled by students using tablets and smartphones, giving instant feedback and reducing teacher workload in terms of marking (Herr & Tippens, 2013).

Kahoot is an extremely useful assessment platform that uses smartphones, tablets or personal computers (PCs). Teachers can create their own quizzes, or use quizzes uploaded by others. When the teacher logs in and selects a quiz, a game pin number is generated. Students then access Kahoot, either using an application, or directly from the website, and enter the game pin generated by the teacher. Questions are in multiple choice format, and students submit their answers using smartphones, tablets or PCs. Teachers can modify the scoring system to suit the purpose of the assessment, for example by selecting whether or not bonus marks should be awarded for speed of answer. Teachers can also set the time limit for each question. Kahoot automatically

marks and analyses student responses. This data can then be accessed by teachers and used to regularly evaluate the progress and capabilities of their students (Dellos, 2015). Since a Kahoot quiz can be completed, marked and analysed very quickly, it is a useful tool for providing teachers with an instantaneous 'snapshot' of pupil progress. In many ways, Kahoot is similar to student response systems, such as Promethean Activote. However, it eliminates the need for specialist equipment and software (Hung, 2017).

Wang and Lieberoth (2016) in the research on Kahoot platform performed the experiment among 593 students. The research aimed to evaluate the effectiveness of using the platform within the classroom. The authors have found that the use of Kahoot improves student engagement, concentration, motivation and enjoyment. Somewhat surprisingly, the authors also found that the competitive and points-scoring element of Kahoot had a positive effect on classroom dynamics and student engagement with the topic.

In the current research the term attitude the term attitude is understood as the teachers' perception of online assessment; their way of feeling and thinking regarding implementation of online assessment in math classes of Saudi Arabia schools. The study generalises the terms of beliefs, values, and perceptions under the term "attitude" in order to get general overview on implementation of online assessment concerning teachers' opinion.

From the literature and research on assessment methods, it is clear that the attitudes of teachers towards online assessment are likely to be affected by these factors. Al-Somali et al. (2009), summarised the effect of teacher attitude: if a particular practice is believed by an individual to enhance their job performance and make their work easier, then the individual will be more likely to embrace the practice. Further, the author

asserts that people's attitudes towards online services are determined by performance expectancy, facilitating conditions, and effort expectancy.

Another, more recent study by Pedreira, Domínguez, and Zubizarreta (2018) concluded that an impact on learning has been observed due to the use of a technology platform as part of a formative assessment. They observed in the study that there was an effect on the student's progress in the software and on the number of topics covered by the students subsequently due to the use of the technology platform. Certain behaviour among students has been fostered by the technology platforms having certain properties. The selection of technology choices has been linked to the learning objectives. The formative assessment strategies can be implemented with the help of technology platforms. According to the research results, formative assessment strategy helps students to reach higher learning outcomes.

### 2.3.2. Online Assessment in Mathematics

Sandene, Horkay, Bennett, Allen, Braswell, Kaplan, & Oranje, (2005) recommended to use online assessment in mathematics due to the suitability of mathematics for automatic assessment. The first advantage described by the authors is measurement: most questions and answers in mathematics can be computer delivered in difference with linguistic sciences. However, it was recommended more for algebra tasks rather than for geometrical tasks. (This recommendation is compatible with the current research as students in Saudi Arabia start to learn geometry in secondary school).

## 2.4. Online assessment vs traditional assessment

Whilst there is considerable similarity between online and traditional assessment methods, such as quizzes, multiple choices, matching, and true and false, some

assessment methods are more suited to one form than to the other, as shown in Figure 1, which illustrates the differences.

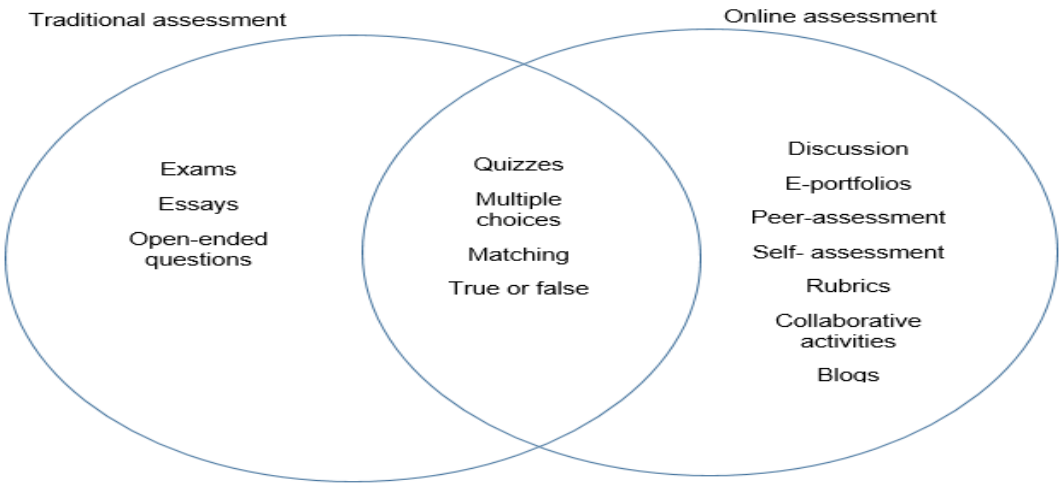


Figure 1: Comparisons of assessment methods showing the main areas of overlap and the main areas of difference between traditional and online assessment methods (Source: based on the findings of Hwang, Hung & Chen, 2014)

Exams, open-ended tasks and essays lend themselves more readily to traditional assessment methods. However, online assessment is ideal for discussions, rubrics, e-portfolios, peer-assessment, self-assessment, collaborative activities, and blogs, since these can be graded and analysed automatically, and feedback can be given to the pupil immediately (Hwang, Hung & Chen, 2014).

Online assessment can be defined as mobile or web-based application that has tasks analyses and evaluation features which teachers' and students' can access (Turau, Fahrenholtz, & Venzke, 2005).

## 2.5. Teachers' views of online assessment

There are a number of factors that may potentially affect teachers' willingness to implement online assessment. In an evaluation of the implementation of Technology-Enhanced Formative Assessment (TEFA), Lee, Feldman, and Beatty (2012) in their study of science and mathematics assessment identified a number of factors that teachers regarded as hindrances. Of these, the most significant obstacles were time limitations and difficulties with question development. The researchers also found that teachers' perspectives about their own beliefs and pedagogies may be dissonant with TEFA (Lee et al., 2012). At present, there is very little published research into teacher beliefs about online assessment. There is also very little published literature specifically related to the use of online assessment in mathematics in Saudi Arabian primary schools. There has been some research into the use of online learning more generally; however, this has been carried out in universities rather than schools (Hussein, 2011). The work of Lee et al. (2012) provides some useful insights; however, the scale of the study was small, with sampling of only five teachers, which limits the wider applicability of their findings. In a slightly larger study involving twelve teachers, Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, and Sendurur (2012) found that teachers' beliefs and attitudes had a significant impact on their use of technology, both in assessment and in wider classroom practice. At least some research has suggested that those teachers with a passion for technology and a problem-solving mentality were more likely to be successful in implementing technology in the classroom (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012). The teachers were selected

with no national or cultural aspects of sampling. While this research has common approaches with the current study (interviewing teachers on the views on online assessment), the authors did not correlate results with any cultural or geographical aspects. The only basis for the selection of participants was the existence of a personal website by teachers.

## 2.6. Assessment in Saudi Arabia

In Saudi Arabia, at the primary school level, implementation of ICT in classrooms is still proceeding slowly and much more slowly than at university level (Alshmrany & Wilkinson, 2017). As part of the King Abdullah bin Abdul-Aziz Project for Public Education Development, a program known as '*Tatweer*', which means development in Arabic language, was introduced in 2007 which, amongst other features, also included Smart Education. However, this was done at the secondary level only and not yet at the primary level. As a result, assessment in the primary school setting is conducted mostly offline and through traditional methods, including summative assessment and formative assessment, although there is no one standard format used (Alotabi, 2014). Moreover, in order to conduct online assessment, there is not enough necessary teacher training for those teaching at the primary school level. According to Mulhim (2013), the teacher training in Saudi Arabia is not yet adequate to improve the teachers' abilities to use the technology and to incorporate it successfully into teaching and assessment.

At present, at the primary school level, Saudi students are still assessed four times a year, using a paper-based test format, according to the Ministry of Education. However, national policy related to the education sector in Saudi Arabia suggests there will be a move to an online assessment system. Therefore, it can be stated that while the exact extent of ICT usage in classrooms in Saudi Arabia may not be known, it is clear that

more efforts need to be taken to understand how these tools can be effectively used for both teaching and assessment, especially at the primary school level. This is particularly true if Vision 2030 of the Kingdom of Saudi Arabia is to be achieved.

## 2.7. Technology in Saudi Arabia

The impact of technology in education is hard to estimate. Since the moment technology became a part of education, it introduced revolutionary changes and challenges to the education systems of countries all over the world (Hardin & Ziebarth, 1996). The uptake of information and communication technology (ICT) has increased in classrooms at a rapid pace over past few decades (Dennis et al., 2010) mirroring the increased use of ICT across the globe in all facets of life. Statistics estimate, the percentage of the population using the internet has increased from 0.4% in 1995 to 54.4% at the end of 2017 (Internet World Stats - Web Site Directory) as many as 3.578 billion people in the world use the internet. Saudi Arabia is not an exception. Altowjry's (2005) research on the development of the educational system in Saudi Arabia stated that distance learning and technologies advantage and expend parameters and opportunities of teaching in the Kingdom. Also, the research demonstrated the positive connection between distance learning using modern technologies and students' educational outcomes in Saudi Arabia.

The potential use of ICT on teaching, learning and assessment is different for students and teachers. For students, access to technology has resulted in a change in the way that they learn, both in school and at home. For teachers, a greater availability of technology has resulted in teachers developing new teaching techniques that incorporate technology into their classrooms (Khokhar & Javaid, 2016). The availability of technology can hinder or aid teachers, depending on the way technology is cultivated

by teachers in a learning environment (Olson, 2017). Olsen (2017) argues that technology is only a tool, and it is not an entire means of learning; however, it provides opportunity for teachers to thoughtfully design and use technology-driven teaching practices in order to reach students better and enable them to learn.

## 2.7. Online assessment in Saudi Arabia

In Saudi Arabia, less attention is paid to online assessment, thus there are a limited number of scholars researching or writing about online assessment in Saudi Arabia (Alruwais, 2016). The results of the research conducted by Alkhalaf, Nguyen, & Drew (2010) demonstrated that the successful implementation of online assessment in Saudi Arabia is impacted by four factors: organisational impact, individual impact, quality of the assessment system, and quality of the educational information. Also, implementation of online assessment is challenging in Saudi Arabia due to the dependency on variable performance and different evaluation standards in Saudi Arabia schools (Al-Alwani, 2014).

### 2.7.1. University Online Assessment in KSA

As a result of increasing population in Saudi Arabia, there has been an increase in those wanting to enrol in higher education. However, due to the highly competitive environment for entry to university, a high percentage of candidates are being rejected due to inadequate standards in their academic achievement. As a result the National Centre for E-learning and Distance Learning was established to provide additional options to university study and as a means of serving the aims of Vision 2030. This centre provides online courses and online education for KSA students (Almegran et al., 2007). The Centre's programs have been made possible by the government of Saudi Arabia integrating online assessment systems and online learning for schools and

universities (Hakami & Dahlan, 2014). This then does point to the direction that education in Saudi Arabia is taking towards greater reliance on ICT and integration of online methods of achieving increased and improved outcomes in education for all citizens.

### 2.8. Online Assessment in Primary Schools

Online assessment has a significant difference in effectiveness comparing with traditional assessment in primary school. According to the Fontana and Fernandes' (1994) research on online assessment in primary schools, most students demonstrated higher scores in online assessment than the control group for the same tasks. The authors explained more effective evaluation of online assessment by excluding additional factors (like stress of direct conversation or caring on writing skills) while assessing.

### 2.9. How Humans' Perceptions Turn into Actual Actions

While the effect of perception on the following action is still debatable, more recent researchers admitted that the action is based on perception. For instance, Humphreys and Riddoch (2007) in their research on the effects of action on perception and attention concluded that the definition of any object always "depends", as it can be perceived differently by different subjects. As definition of the object depends on its perception by the subject, following action on the object by the subject also depends on its perception. However, it is also important to note that perception of the subject is dynamical and changeable as there could be provided additional information on the subject. In the context of current research, it would be evaluated the teachers' perception of online assessment and this perception would be evaluated in the concern of using online assessment currently or in the future in Saudi Arabia schools.

# CHAPTER 3: METHODOLOGY AND DESIGN

This chapter of the research identifies and describes the methodology and design chosen for the research, including the theoretical paradigm of the selected methodology, description of the data analyses, sampling, and ethical codes of the paper.

## 3.1. Theoretical paradigm

Due to the nature of the study, which focuses on Saudi Arabian teachers' opinions of online assessment in Saudi Arabia, a qualitative research design was selected. According to Burns and Grove (2003), qualitative approaches describe in the best way situations in life and professional experience of people and give them exact meaning. Wheeler (2002) recommends using qualitative research methods as they provide the vision of social enquiry on the way people interact with the specific subject. According to Streubert and Carpenter (1999), researchers using qualitative research methods focus mainly on the participants' experience; therefore, qualitative research was the best fit to describe and explore opinions of teachers in Saudi Arabia on using online assessment in mathematics in schools.

The research uses semi-structured interviews with participant teachers to collect data (see Appendix IV), as this qualitative research method allows an in-depth exploration and documentation of participants' beliefs. The results of interviews can then be used to draw conclusions by collecting descriptive information regarding the meanings that participants attach to events and experiences (Taylor, Bogdan, & DeVaul, 2015).

The main advantage of the semi-structured interview is the ability to obtain deep information on participants' experiences, opinion, and future vision of the issue being studied. An additional advantage of semi-structured interviews is that it is relatively

easy systemise and analyse the collected data. For the semi-structured interviews interpretive approach was applied, as the interpretive approach was judged most suitable in order to reach the research target and to answer all questions stated in the research. The interpretive approach is based on the concept that knowledge is filtered through social constructions; these include language and culture. It aims to interpret data within a social context, and to understand the ways in which phenomena influence and are influenced by their social context (Pietkiewicz & Smith, 2014). An important feature of interpretative research is that it acknowledges there may be relationships between researchers and their subject material. As an example, cause-and-effect relationships between different factors, and if there is a correlation among different factors and materials, may be interpreted differently by different researchers (Rowlands, 2005).

The research investigates teachers' views on the subject of online assessments of students in mathematics in primary school in Saudi Arabia and analyses the influence of these views. The philosophy of the selected methodology is underpinning the aims and objectives of the research. Hence, the most appropriate choice of methodology is interviewing of teachers. In this research an interpretivist position is adopted by the researcher. Within the qualitative research method and interpretivist stance, the research is concerned to identify teachers' opinions regarding the topic.

### 3.1.1. Semi-Structured Interviews

Semi-structured interviews allow a degree of flexibility for the researcher because, although there is a set of predetermined questions, the researcher is not constrained by these, but may probe interesting responses in more depth (Taylor, Bogdan, & DeVaul, 2015).

When conducting interviews, Jäckle, Lynn, Sinibaldi, and Tipping (2011) assert that it is important to be aware of the potential impact of interviewer effects. These occur when the interviewee's responses are influenced by the presence of the interviewer. Interviewer effects are most significant when there is a power differential between interviewer and interviewee; this can introduce undesirability bias, where the interviewee seeks to present themselves as favourably as possible to the interviewer (Qu, & Dumay, 2011). Interviewer effects is minimised in this work because the researcher is independent having no relationship with the participants or the schools they teach at; therefore, no power differential exists. In addition, all participants will be assured that their responses will be anonymous in the final work.

When designing questions to be used in the interview, it is important that closed questions be avoided, although the inclusion of some may be useful, for example, in giving background information about participants (Ibabe & Jauregizar, 2010). Open questions, which allow the interviewer the flexibility to probe more deeply, are a more effective method of collecting qualitative data (Turner, 2010). Open-ended questions are more useful because they:

- Allow infinite numbers of possible answers
- Help in collecting more detail
- Aid in getting adequate answers to difficult issues
- Encourage innovative answers and help in self-expression (Doody, & Noonan, 2013).

## 3.2. Methods of administration and data collection

Face-to-face methods, were utilised to collect interview data. Written consent of participants was obtained for the audio recording of interviews, to allow transcribing and analysis of interviews.

## 3.3. Data analysis

Qualitative research requires flexibility in data collection and in data analysis. The first step of conducting analyses is preparing the data. The data from interviews were transcribed verbatim and are represented in Chapter 4: Findings. The whole data set was then read in order to create the whole picture of the situation (Elliott & Timulak, 2005).

The collected information was categorised in order to compare answers of every participant regarding every specific issue. Thus, the research obtained units of meaning. Every unit was analysed and discussed with the interpretive approach.

## 3.4. Participants and sampling

The research population consisted of six female teachers selected from girls' primary schools in Saudi Arabia. Education in Saudi Arabia is segregated, with boys taught separately from girls. Due to cultural factors, it is not possible for the researcher to include boys' schools in the research, which is, therefore, limited to female teachers working in girls' schools. In addition, a purposive sampling strategy was used to ensure a broad cross-section of participants in terms of demographics and length of service (Etikan, Musa & Alkassim, 2016). Purposive sampling identifies participants by using certain criteria, as opposed to random sampling which selects participants on a purely random basis. The use of purposive sampling in this work was to enable the researcher

to determine whether extrinsic factors, such as age, length of service or kind of school, have any impact on teachers' beliefs. Table 1 offers a tabular representation of the data population.

The study was conducted in different types of schools in Saudi Arabia in order to get a detailed understanding of the present mode of using e-assessment in the classroom.

Table 1. Data population showing numbers of teachers and their schools.

| School | Number of Teachers | Type of School | **Estimated Time** |
|---|---|---|---|
| School A | 3 | Government | 60-90 minutes for each participant |
| School B | 2 | Islamic | |
| School C | 1 | Private | |

### 3.5. Research Ethics

There are no child protection or access considerations in relation to this work, since direct contact with children is not involved. However, it is important that the research is carried out ethically in relation to the adult participants, and that participation in the project will not harm participants in any way. The ethical approach was applied to the entire research. The ethical approach means that the research is not limited to data collection and analyses only but ensures that the performance of the research is done with consideration of safety, well-being and rights to everyone who was directly and indirectly involved into the research (Stuart & Barnes 2005). For this reason, ethical approval has been sought and awarded both by the Social and Behavioural Research

Ethics Committee (SBREC) of Flinders University and The Ministry of Education in Saudi Arabia prior the work commencing (See Appendix I-II) .

Efforts were also made to ensure that participants were fully informed of the purpose, scope and dissemination of the project, and informed consent was obtained in writing before any interviews took place. Participants had the right to withdraw at any time, and to decline to answer any questions should they prefer not to. Specific written consent was obtained for interviews to be recorded; participants were informed as to exactly how recordings were to be used and disseminated. Participants were advised that it may be desirable to include full transcripts of some interviews as appendices to the final dissertation. If there is such a case, specific permission would be obtained from the relevant participants (see Appendix III).

All data was completely anonymous, so that confidentiality is ensured for participants and their schools. Electronic data was stored and used according to data protection legislation in compliance with Flinders University policy.

# CHAPTER 4: FINDINGS

## 4.1 Introduction

The participants interviewed were from different types of schools, including government, Islamic (religious) and private schools. The participants talked about their experiences and preferences in their work life. They talked about different methods they use in their teaching as well as their ideas regarding assessment and specifically assessment in mathematics.

All participants were native speakers of Arabic. The research was not limited by the selection of participants who could also speak English. Thus, it was decided to perform the interviewing in Arabic language to be more comfortable for participants to express their thoughts and emotions regarding every question they were asked.

Once the interviews were conducted, they were translated into English. The interviews were translated by the researcher. There were no difficulties within the translation as the first language of the researcher is fluent in both Arabic and English.

Following this step, the translated transcripts were then subjected to a thematic analysis. The aim of this thematic analysis was to analyse the views of the interviewed teachers about online assessment, and how these views influence their decision to implement or not implement online assessment.

Figure 3 below visually represents and summarises the different aspects that emerged from the application of the qualitative analysis method to the transcripts of the interviews conducted with the six teachers. It is, in essence, a visual representation of the findings described in Chapter 4.

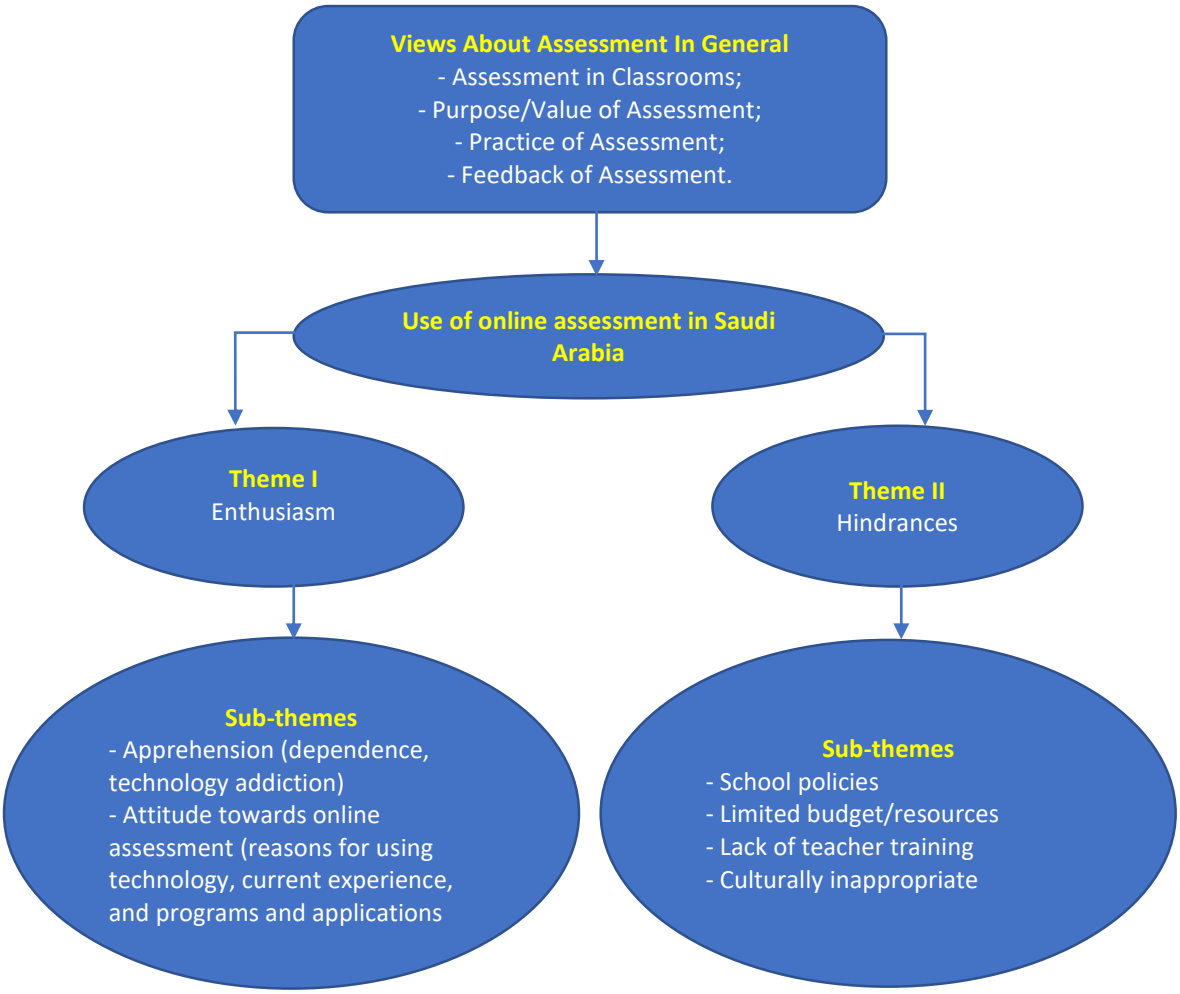


Figure 1. Visual representation of thematic analysis and findings of the research interviews.

The discussion of online assessment with the teachers was accomplished in two ways. First, attitude towards online assessment was discussed and, next, came hindrances of implementation of online assessment in Saudi Arabia schools.

Figure 2 demonstrates what was discovered about the teachers' attitudes towards online assessment during the discussions, which identify the first theme "Enthusiasm" and "Apprehensions" concerning the willingness of teachers to adopt the practice of online assessment in classrooms. Under the section, further sub-sections emerged. They were 'Reasons for use of technology', 'Current practice: limited use of online assessment technology', and 'Recourses for online assessment'. These sub-sections illustrated the teachers' enthusiastic attitude towards online assessment and how they presently use

technology in support of their education plans. “Apprehensions” section contained the sub-sections ‘Inappropriate in primary school level’, which included concerning factors, such as “Dependence and technology addiction”.

‘Hindrances’, the obstacles to online assessment, were discussed in terms of how frequently and effectively the method could be applied. The first sub-section under this was ‘School policies’, other categories that were analysed included ‘Resources/budget’ and ‘Lack of teacher training and inadequate classroom time to practice online assessment’, and ‘Culturally inappropriate” in the context of implementation.

## 4.2 Background

### 4.2.1 Study Location

The research was conducted in Madinah, the holy city of Saudi Arabia, which is situated in the western part of the country (refer to Figure 3. Location map). The city of Madinah (meaning ‘the radiant city’), also known as Medina, is the second holiest city in all of Islam and in Saudi Arabia. In terms of its religious importance, Madinah is second only to Makkah, or Mecca, and is the administrative centre of Madinah Province, with a population of 1,183,205 people[1] (2009), according to the statistical data from the Saudi Arabia government. Due to religious sensitivities, only Muslims are allowed by government law to enter the main city limits. Compared to other major cities in Saudi Arabia, such as Jeddah and Riyadh, it is smaller and considered more slow-paced. Thus, it is important to consider relational and socio-cultural aspects in the results of the research, as well as to take into consideration that performing the research in other regions might have different results.

[1] https://www.stats.gov.sa

In the city, there are 305 primary schools for girls. Like other districts and cities in the Kingdom of Saudi Arabia, education for boys and girls is strictly segregated. Of the 305 schools, 16 are private, whereas 25 of them are Islamic or religious schools and the remaining are government schools. Madinah is also home to major universities, such as the Islamic University and Taibah University (Ministry of Education, 2018).


Figure 2. Location map of Medina, the study area in Saudi Arabia (Google, n.d.)

4.2.2 Participants' Background

The backgrounds of the six teachers who were interviewed were quite varied as to the subjects they taught, the number of years they had been teaching, and the grade levels of their students. Table 2 below summarises these characteristics of the teachers. As can be seen from the table, two teachers were from Islamic (religious) schools. They are denoted below as Daad and Hana (pseudonyms). Two other teachers were from government schools. They have been denoted below as Aya and Lama; while one teacher had a non-mathematical background and is denoted below as Nur. One teacher

was from a private school and has been denoted below as Sara. Of the six teachers' interviews chosen for thematic analysis, five had a specialisation in mathematics whereas one, represented as Nur, had a specialisation in art, as shown in Table 2.

It's important that current research evaluates attitude towards online assessment of teachers with varying experience of teaching maths. Years of teaching experience is demonstrated in the Table 2 of the research. The number of years of teaching experience varied from four years to 22 years and their preferences for teaching ranged from primary to high school.

Table 2. Characteristics of interview participants

| No | Pseudonym | Sex | Education Specialise | Years of Teaching | Teaching Grade/Level | Type of school |
|---|---|---|---|---|---|---|
| 1 | Aya | Female | Mathematics | 22 years | Year 4 & 6 | Government school |
| 2 | Lama | Female | Mathematics | 17 years | Year 5 & 6 | Government school |
| 3 | Nur | Female | Art | 7 years | Year 1 & 3 | Government school |
| 4 | Daad | Female | Mathematics | 10 years | Year 5 & 6 | Islamic (religious) School |
| 5 | Hana | Female | Mathematics | 6 years | Year 5 & 6 | Islamic (religious) School |
| 6 | Sara | Female | Mathematics | 4 years | Years 5 & 6. | Private school |

Participant 1 (Aya)

Aya a very passionate and pro-active teacher has 22 years of experience in government schools. She has attended many additional training sessions in different cities including Dubai, and is eager to explore new strategies and methodologies that could improve teaching. Her preparation for the interview was meticulous; she brought files and

[2] Pseudonyms like this have been used throughout this thesis report for each participant to maintain their anonymity.

relevant documents containing evidence of her effort to deliver high-quality teaching. Prior to becoming a teacher, Aya was a student of medicine in Jeddah, but due to unavoidable circumstances, had to quit her medical studies and relocate to Madinah. Aya pursued mathematics as her major topic and became a mathematics teacher. Aya said that she enjoys teaching mathematics; algebra is the most interesting part for her, as it is fundamental to all aspects of daily life. Aya has been teaching for long time at various educational levels including primary, secondary and higher secondary but states that she prefers teaching at the primary school level.

### Participant 2 (Lama)

The second participant Lama has 17 years of experience in a government school. The first four years of her teaching was in an intermediate school and then she moved to teaching at the primary level. Lama has taught Grade 6 and currently teaches Grade 4. Lama stated that she preferred teaching at the primary (Years1-6) rather than the elementary school (Years 7-9) level as she finds it easier.

Recently Saudi Arabia has updated textbooks and curriculum and Lama stated that she liked the new book of mathematics as it contains many activities which reintegrate her passion for math teaching and show her new methods to explain context. Although she states that she does not have the knowledge to use technology, her daughter in Grade 6 helped her to download different digital applications on her I-pad which she has used to motivate her students.

### Participant 3 (Nur)

Nur works in a government school and, although she teaches math, she does not have a mathematics background. Her speciality is in fine arts. In her first three years of working, she has taught both art and mathematics. The reason she has taught two

subjects in primary schools has usually been needs-based, as specialised teachers for every subject are not usually provided at the primary level. Nur likes teaching mathematics and has focused on the subject over the last four years. She prefers teaching to students from Grades 1 to 3. In terms of mathematics knowledge, Nur explained that she asked the expert teachers for help in student assessment in the beginning due to her limited knowledge and experience. Based on her experience, she recommends that mathematics teachers have the proper educational background for teaching mathematics.

Participant 4 (Daad)

Daad works in a religious Islamic school and has 10 years of experience, with a specialisation in mathematics. She likes mathematics and enjoys her teaching experience. Her preference is to teach at a higher level in primary school as the students are more mature and easy to deal with. She has been using technology in her class as the students really take interest in learning mathematics when using technology.

Participant 5 (Hana**)**

Hana stated that she has been teaching for six years and started her work in a countryside schools near Yanbu. Later on, she moved to Madinah. Her school starts in the afternoon and classes run from 12pm to 5pm, so her mathematics classes are shorter than mathematics classes at other schools. She had teaching training in Yanbu in Communion Royal School. This school is supplied by latest communication technologies and is open for new ideas. Based on Hana's experience, the school pays great attention to train teachers to use technology within a class as well as for assessments. So, she has more awareness of online assessment methods than some other

teachers do. Hana is really interested in using the internet in class. In terms of content, her preference is to teach algebra at the primary school level.

Participant 6 (Sara)

Sara has been teaching for four years in a private school and has taught at all education levels except Year 12. She prefers teaching at the high school level because she finds the students are responsible for focusing on their studies, whereas younger children need more encouragement to stay on task. As is common in many private schools, rather than working across many subject areas, Sara focuses on mathematics and classes of students come to her for specialised math lessons. She has been using technology in her class to assess students and the school has their own assessment system called Classera[3].

## 4.3 Views about assessment in general

### 4.3.1 Assessment in Classrooms

When discussing generally the use of assessment in their classrooms, teachers discussed why they needed assessment and how they used assessment, the techniques through which assessment was conducted, the use of formative/summative assessment. They also identified the means through which feedback to the students was provided and, finally, why the assessment had or did not have value to the students, and to themselves in the teaching process. This section evolves with a description of purpose, current practice, value, and feedback assessment system.

[3] "Classera is an e-learning system that has been adopted for use in a variety of learning environments in K-12 schools in Saudi Arabia. The system can be integrated in online, blended, or traditional settings with the aim of improving teaching and learning and helping students connect with lesson content, teachers, and peers, and teachers connect with parents." (Alahmari & Kyei-Blankson, 2016, p. 11)

### 4.3.2 Purpose/Value of Assessment

Over the course of their interviews, the teachers discussed the purpose and value of assessment, and their reasoning behind applying assessment. For some, the purpose of assessment was to tick off the record that a student was able to pass a level/grade. “It is mainly to review students’ progress, check the student level, and to see if she has mastered the skill”, - answered Aya.

However, for most of the teachers interviewed, the purpose of assessment was to ensure that a student had achieved the sets of skills and knowledge as outlined in the curriculum. ‘Learning’ as the fundamental value of assessment was not a key highlight in their description, and the discourse was limited to a shallow application of assessment merely for confirming set rules and standards. The teachers’ answers regarding purpose and value of assessment are demonstrated in Appendix V.

Though every teacher had their own vision of value and purpose for assessment, their answers demonstrated a greater role of assessment in the class. According to the interview answers on using assessment, teachers can evaluate students' progress and their understanding of rules and class topics, while assessment helps a teacher to know weak and strong points of students, and to conclude if the teaching plan is effective. Mostly common among the teachers is the idea that assessment demonstrates to them if they can go further in their learning plan and if students are ready to advance to the new topic.

Concerning the practice of assessment, teachers discussed the means through which assessment is carried out at their schools. These ranged from methods such as short exams and peer review to self-assessment and worksheets. It was interesting to note their initial views about ‘assessment’ in general, particularly because none of the

participants at this stage made any noteworthy discussion about online assessment. Interview answers are provided in Appendix VI of the research.

Every teacher interviewed had their own ways of assessment, including but not limited to math paper book assessment, end-class or end-unit tests, group tasks for assessment, verbal and written assessment task. All research participants prefer to assist their students at the end of the class and at the end of the unit. For instance, Sara answered, "Always after each lesson, I give them a short test at the end. And, I give this test until they reach the level of skills".

#### 4.3.4 Feedback of Assessment

During their interviews, the teachers emphasized that assessment provided a means of feedback. Based on the views of participants from this study, the role of feedback has been perceived mainly towards correcting students' performance. Less importantly for teachers was a range of feedbacks. Teachers also see assessment as the way to evaluate their job, which they regard as important for a teacher herself and to the teaching, learning and assessment activities ongoing in a particular school. HANA gave the procedure for feedback as following: "Each time we test a student we decide if she understands and is able to move to the next level, or if she needs more work and explanation and more activities to learn". The answers are provided in Appendix VII.

### 4.4 Teachers' opinions regarding online assessment

This section is devoted to demonstrating teachers' attitudes towards online assessment and identifying hindrances to the implementation of online assessment in Saudi Arabian schools. The teachers' answers to questions in interviews are provided in Appendix VIII.

### 4.4.1 Enthusiasm

#### 4.4.1.1 Attitude towards online assessment

Attitudes toward online assessment in a general sense, the availability of online or Internet services is a relatively recent development, particularly in Saudi Arabia. As such, different people are likely to have different attitudes towards online operations and their acceptance of online services may be determined by a number of factors. For example, research conducted by Al-Somali et al. (2009), which looked into the acceptance of Internet banking in Saudi Arabia, indicates that whether customers use online services with their banks or not was mainly determined by the perceived usefulness and perceived ease of use. People who were unlikely to use Internet banking were those who lacked awareness of the benefits of online services, or who lacked competency in computer use, lacked trust, or simply were resistant to change. Other studies of the adoption of online banking and e-government services have found wide variation in acceptance rates that suggest influences from numerous variables, including age, gender, education, familiarity with technology, and national culture, among others, as playing a role in moderating consumer acceptance (Mutahar et al., 2009; Ali et al., 2018).

There are some obvious similarities in the application of the technology acceptance model (TAM) between online assessment in education and other online information and service functions in other areas of society and governance.

The analysis of teachers' answers on their attitude towards online assessment in this study reveals similar results: that willingness to use online assessment was often related to efficiency of accessibility of teaching resources and information, and their perceptions that the technology makes teaching a more enjoyable and entertaining job.

For example, DAAD argued that: “The only difference is that technology learning and assessment tends to be more enjoyable and I think students like it better than using test papers”. With respect to using technology for teaching, the interviews showed that it was mainly used to help teachers to find online resources. As an example, one teacher (NUR) mentioned in her interview that she uses the internet in her work to find new ideas and to improve her teaching skills.

Regarding assessment and evaluation, the use of online technology was perceived as an easier, more efficient approach with continuous access for students to ask questions or post comments and teachers to provide feedback. For instance, participant Hana answered that she saves a great deal of time when using online assessment that she can then apply to other tasks.

While the participants wish to use technology for online assessment, they still need more information on effective ways of implementation the technology into the teaching process.

First two subsections (“Applications and Programs used for online Assessment” and “Recourses for Online Assessment”) stand for the discussion in the “Enthusiasm” context, next are discussed “Apprehensions”.

#### 4.4.1.2 Applications and Programs used for online Assessment

The current practices of using online assessments, as described by the participants, is illustrated through the use of ‘Applications/Programs’. The teachers described the types of online applications, or apps, as well as software programs and websites used by them to conduct assessment. Interview answers are demonstrated in Appendix IX.

According to the interviews, every participant has a different platform that they use to work with in order to evaluate a student's knowledge or to share additional information.

Teachers mentioned the following platforms, applications, and websites: Plickers application for answering questions on the studied topic, online platform Classera, Google drive, YouTube lessons, Afkar Alreiadiat website for students' online competitions, and Roller application for quizzes. It is important to note that all participants in the research used their iPads as hardware that helps them to control the online assessment process. As an example, LAMA answered: "I did bring my own iPad to class a few times where the students can gather and work on some of the math application".

#### 4.4.1.3 Recourses for Online Assessment

It is evident from the interviews that participants are experiencing lack of enough resources for practising online assessment as a routine job in every class. Schools still appear to have not created an enabling environment to encourage teachers and students to use online technology. Participants had a range of demands and requests to make for teaching support resources from the education ministry, such as iPads to distribute to every student for classroom practices, or vsmart-labs. The teachers interviewed all wish to see in the near future schools well equipped by special labs and classes with iPads or to have smart labs where students would be provided with all necessary technical equipment for study and evaluation processes (Answers to interviews are available in Appendix VI).

The teachers' opinions regarding using online assessment in most cases is positive and their attitude towards using technology and online assessment is evaluated as "Enthusiasm[4]". However, teachers also discussed in the interview some obstacles to implementation of online assessment in Saudi Arabia schools, which are evaluated by

[4] (In the content of the research paper) Enthusiasm is positive vision of implementation of online assessment

the research as “Apprehensions[5]”. For example, SARA suggested that: “If they offer a special lab at school it will be a great idea. If they offer iPads for every girl under the teacher’s guide it will be better”.

4.4.1.4 Apprehensions of Implementation Online assessment

Teachers in their answers mentioned two main apprehensions:

- Dependence\dull
- Technology addiction

The teachers also mentioned their arrangement with regard to online assessment. These were mainly about their view that online assessment is not appropriate for young children at primary level. These teachers believed that online assessment practices in the primary school is likely to make children addicted to technology. They explained that it is not a two-way active teaching and learning and assessment activity; and it might just burden students with too much information rather than providing a deeper insight about the topic of the study.

Teachers also gave a recommendation on how to avoid possible negative effects of using technology within a class task and within the assessment process. First, children should use the technology under the control of teachers or parents. Second, it should complement traditional study methods and not be used as a single tool. AYA answered in the interview: “When you provide them with the book online, they might lose their ability to write and might lose other skills and become dependent on technology…” Teachers answers on apprehensions are demonstrated in Appendix VII.

[5] (In the content of the research paper) Anxiety of negative outcome of using online assessment.

### 4.4.2 Hindrances

Under the theme of 'Hindrances', the teachers' views on obstacles to the use of online assessment were analysed. Under this theme, 2 sub-themes emerged, namely, 'School Policies (resources/budget), and culturally inappropriate (teachers' views about parents' opinion of online assessment and use of technology).

#### 4.4.2.1 School Policies

Discussed in this section is the perceived the lack of resources and budget to carry out online assessment and the lack of teacher training. Included also is time management of the class, and how it is now perceived as being too short to ensure that every student learns from the online assessment.

#### 4.4.2.2 Resources and budget

Participants shared the opinion that the lack of adequate resources and limited budget are the main obstacles to practising online assessments. Interview answers are provided in Appendix VIII.

According to HANNA, "The school has no facilities. We don't have any smartboards. The budget is not enough". Also, teachers mentioned that in public schools there are not enough facilities, not every student has a computer in the class, thus it will be complicated to implement online assessment. Therefore, lack of finance and an inadequate budget were determined by teachers to be a major hindrance to applying online assessment techniques.

4.4.2.3 Lack of teacher training and inadequate classroom time to practice online assessment

According to the teachers, another significant hindrance in the use of online assessment was the lack of capacity, time and training for the teachers. It appears that teachers were concerned more about reaching the target through book-based learning, rather than becoming flexible about achieving the learning purpose. Consequently, they did not appear to recognise the importance of using online assessment as best practice that delivers teaching and ensures that students have learned what is being taught. As an example, LAMA admitted in the interview: "I need training. There are many features that I don't know how to use. For example, they brought smart boards into school but they didn't teach us how to use it." Answers are provided in Appendix IX.

4.4.2.4 Culturally inappropriate

The teachers were afraid that students would use the devices provided for online assessment for reasons other than education, such as Facebook, Instagram or any other social media. Posting such photos in social media, especially of women, is not considered culturally appropriate in Saudi Arabia. Students and teachers are afraid that their photos would be shared in social media accounts. HANA explained: "It is something beyond my control. It may be that they [female students] are afraid, they [students] might take photos and share them on the internet". Answers are provided in Appendix X.

## 4.5 Summary of the findings

Based on the thematic analysis, two main themes emerged that pertained to the research questions. These were the attitude of the teachers towards online assessment and the hindrances to their application on a sustained basis in their classrooms.

## 4.6 Conclusion

Based on the thematic analysis conducted on the interviews of the teachers, the shades of their views on online assessment emerged. These findings will be discussed in detail in Chapter 5, along with the ways in which they answer the research questions, as well as what aspects of those questions the findings do not answer. The further questions that the thematic analysis has raised will also be discussed in Chapter 5, ‘Results and Discussion’ of thematic analysis.

# CHAPTER 5: RESULTS AND DISCUSSION

## 5.1. Theoretical framework

In this part, the findings from the thematic analysis will be listed and a theoretical framework will be constructed to answer the research questions. These answers are derived from the views of the interviewed Saudi teachers about online assessment, and how these views influence their decision whether to implement or not implement online assessment. In order to do so, the themes and sub-themes will be further studied to produce a theoretical framework through which to understand the findings and further discuss them.

Below is the theoretical framework that was derived from the thematic analysis conducted on the teacher interviews. The framework was constructed on the basis of the relationship of the themes that emerged with each other and in relation to how they answer or link to the research questions posed at the outset of this work. The framework shows that, according to the statements made by the teachers, a positive inclination towards the use of technology for the purposes of online assessment, within prescribed limits given to the students, combined with an ability to access and understand the use of technology, could influence teachers in implementing online assessment in mathematics.

However, two types of hindrances to this implementation exist – external obstacles, such as school policy and the teachers' difficulties, for example, the negative inclination towards the use of technology for online assessment. These relationships between the hindrances and the teachers' inclination towards online assessment are shown in Figure 4 below and will be further detailed and explored in the discussion part.

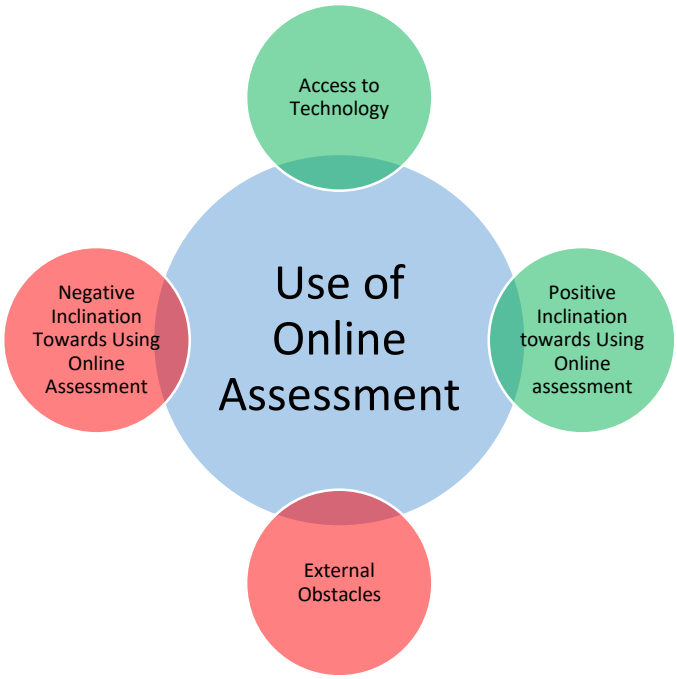


Figure 3. Theoretical framework

The Figure 4 diagram of the theoretical framework posits that an enabled access to technology combined with a positive inclination on the part of the teachers towards the use of online assessment can lead to the implementation or use of online assessment in mathematics. However, barriers exist that can prevent such an implementation. These barriers include external obstacles and a reinforcement of the negative inclination towards using online assessment. Next, this chapter will further explore each of the above-mentioned four factors.

## 5.2. Results and discussion

In this part, the aim is to discuss the findings of the interviews and the thematic analysis performed on them, both individually and in reference to the theoretical framework that has been formulated, in order to answer the research questions. When considering the findings individually the aim is to examine them to see what themes emerged from the interviews. By examining the findings through the lens of the theoretical framework,

the aim is to see the relationships of different themes that emerged from the thematic analysis and to allow this to inform potential answers to the research questions.

### 5.2.1 Discussion of themes

The views of teachers about assessment was an area of exploration over the course of the interviews and the subject was discussed extensively by the teachers.

The six teachers discussed how they viewed assessment, how they preferred to conduct assessment, and how assessment in general aided in their work and the means through which they conduct assessment. This was then classified as ‘Practice of Assessment’. When it came to the practice of assessment, it was clear that there was no single method that all of the teachers preferred. Methods ranged from individual assessment, peer assessment, self-assessment, and verbal assessment. The teachers stated that they used tools, including activity books, skills papers, worksheets and tests, in order to conduct their assessment. There was also a demonstrated willingness to ensure that the children do well in the assessment, including giving students more than one chance in order to complete the assessment.

The teachers also discussed why the assessment was conducted by them. These results were classified under the sub-theme ‘Value/Purpose of Assessment’. The most common motivation was to evaluate whether the students comprehend the lessons and the materials provided to them. Another common motivation was that of assessment of their own teaching; teachers stated that the purpose of assessment was not only to find out if the students understood what was being taught to them, but also to ensure that, as teachers, their methods of teaching were proving effective. Daad explained, “The main purpose is to achieve my goal which is that all my students understand. For students it is important because I have to know if they have improved before I move onto another

lesson." Teachers also mentioned that assessment aided them in ensuring that students were improving as they progressed through the classes, and that they had mastered the skills. Lama mentioned that assessment was a means through which she could find the students' weak points. Sarah's point was that assessment helped teachers find out if the student was ready to progress to the next level. It was evident from the interviews that the teachers viewed assessment as a sort of feedback loop, which led to the aspect of, 'Feedback'. They stated that it functioned as a way for them to generate feedback for themselves regarding their effectiveness as teachers. It also enabled them to generate feedback for the students regarding their individual performances.

Based on the thematic analysis, two main themes emerged that pertained to the research questions. These were the attitude of the teachers towards online assessment and the hindrances to a sustained application of online assessment in their classrooms.

Interestingly, the teachers expressed both enthusiasm and apprehension over using online assessment. Enthusiasm was expressed similarly by teachers from government, private and Islamic schools, whereas apprehensions were primarily expressed by the private and government school teachers, with the teachers from the Islamic schools expressing fewer apprehensions.

#### 5.2.1.1 Enthusiasm

Under the category of enthusiasm was discussed the attitude of the teachers, towards online assessment. In the context of "Enthusiasm", perception was analysed as willingness of teachers to practice online assessment. This analyse included reasons for using technology in assessment and teaching, and current experience of online assessment, as well as what programs and applications teachers use and what hardware is more comfortable for use in online assessment practices. Discussion of these issues

illustrated the teachers' positive (enthusiastic) attitude towards online assessment and how they presently use technology in support of their education plans (Detailed relations among themes are demonstrated in Figure 3).

It was clear that, in general, teachers were positive and enthusiastic about their present and continued use of online assessment in teaching of mathematics. The teachers stated that, given that this is the Internet age, children are already using or have an enormous amount of access to information and communication technology on a day-to-day basis. This was explained by Hana, who suggested that she would be, "the first one to use it in addition to the textbook and the activities book. She added that her class, "will not be using only the book but the book and the iPad together to make it easier and more enjoyable."

Therefore, the teachers suggested that it made sense to use ICT in teaching and online assessment as well, instead of just using it for games and entertainment. It was also stated that as mathematics was a tough subject, therefore, using ICT may make the subject more accessible. With regards to assessment, it was stated that using ICT and conducting the assessment online reduced time spent on the activity in a significant way, thereby making it much more efficient. The students' experiences were also a significant factor mentioned by the teachers. According to the teachers' opinions, students were more engaged, more confident and enjoyed themselves more by using online resources and iPads in mathematics, and students improved more when using online assessment. As for 'Reasons for the Use of Technology, the teachers stated that they used technology to improve their teaching by learning various new information and techniques online. In addition, they used ICT to assess and evaluate their students as it acted as a timesaver, and to receive feedback on their teaching.

When discussing their current practice, teachers spoke of different online platforms, websites, programs and applications (or apps) that they used in order to conduct their assessment. One platform was 'Apps/Programs'. In some cases, teachers used specialised educational programs or applications. Some that were mentioned were Classera, Plickers, Roller and a website named Afkar Alreiadiat. In other cases, the teachers used general online platforms, such as YouTube and Google, to find specific educational tools to conduct the assessment. One interesting trend that emerged in the discussion about online platforms was that teachers stated that the usage of apps or programs was often done in a game or competition manner, such that students would get points for answering questions. This motivated the students and, according to the teachers, kept them engaged in the exercise of assessment. As for what technology the teachers used to conduct the assessment, the most commonly used devices were iPads and laptops. Because not all classes in the schools are well equipped with the necessary technology, teachers used their own personal tablet or iPad in the classrooms to conduct the assessment. Teachers also expressed the hope that in the future classrooms would be better equipped and it will be possible to conduct an online assessment using schools' equipment.

Another sub-theme under 'Enthusiasm' theme was 'Resources of Online Assessment'. The teachers made the point that the schools could provide special resources in technology so that teachers and students can be enabled to use them effectively, and without having to rely on their personal laptops or tablets to aid in teaching and learning. To this end, different suggestions were made. One, the idea of a 'smart lab', was suggested. It was suggested by one teacher that each class could have access to such an equipped smart lab once or twice a week. Another teacher suggested that it

would be even better if each individual girl was given their own iPad, under the supervision of the teacher.

Under Apprehensions was the sub-theme ‘Inappropriate in primary school level’, which included Dependence\dull and Technology Addiction. One issue that the teachers mentioned was an overt reliance on technology, resulting in students being unable to function well without it. Here, teachers mentioned that in paper tests, the students were required to show the steps that led them to the answers, whereas in online assessments, they had to choose from a set of multiple choices, thereby robbing them of a chance to show the workings of a solution to a mathematical problem. Alternatively, one teacher mentioned a fear that students may simply search for the answers on Google, rather than actually work out the problem. Despite earlier statements that online assessment would increase time efficiency, Sara ‘who is working in private school’ mentioned that, in her experience, online assessment took up a lot of time.

This point related to the teachers’ idea that using technology can foster an unhealthy dependence on it on the part of the students, thereby depriving them of the ability to solve the problems on their own. Moreover, students may be tempted to cheat when given easy access to technology, such as Google, whereby they can simply search for the answer on the internet instead of using their skills to solve problems. Students may also allow somebody else, perhaps a parent, to solve the problems for them, which in a program or application like the previously mentioned Classera, would go undetected. The teachers also mentioned apps, such as HOLLOL that provide solved problems with answers attached, thereby enabling the students to cheat and at the same time, dulling their minds and skills.

Teachers had some rules or caveats that they felt must be used in conjunction with online assessment. Without these, they felt that it would not be advisable to use online assessment. They suggested:

- students must be taught to use online tools responsibly,
- the schools must provide the ICT to the students so that they have adequate and equal access to the internet,
- online assessment could be used only in conjunction with textbooks,
- online assessment only used once or twice a week,
- online assessment would be better to use for high school or university students, rather than those in primary school.

#### 5.2.1.2 Hindrances

Theme 2 was 'Hindrances' which highlighted the obstacles in the way of using online assessment more often and more effectively, according to the teachers. The first issue discussed was 'School Policies' which included 'Resources/Budget', 'Lack of teacher training, and inadequate classroom time to practice online assessment'. Under this theme, the teachers also mentioned that a lack of facilities and budget to enable online assessment was preventing wider use of online assessment in Saudi Arabia. In this regard, the lack of smart labs was mentioned and the need for a specialised website for school activities that can be easily accessed by both students and teachers alike. The teachers mentioned that the lack of financial resources and budgets played a role in not being able to implement online assessment as the schools were constrained by this factor. Hana explained, "In public schools only sources available for free are used, there is no budget for expensive technology".

Another sub-theme was the lack of training for teachers and their lack of capacity in the area of online assessment. The teachers stated that in order to be able to use the technology, they require training that must be provided by the school. According to them, at present, they did not have enough knowledge on the technology and online resources to effectively use them in assessment in mathematics. Lama suggested that she needed training because, "There are many features that I don't know how to use." Apart from this lack of training, they also mentioned that the large number of students in their classes was a significant obstacle, with some classes having upwards of 40 students. Apart from this, time was also an issue as a class usually lasted around 45 minutes, not leaving enough time to conduct an online assessment.

The second issue was 'Culture'. The teachers were also fearful that unrestricted use of technology would lead to the crossing of cultural boundaries. When pressed further, some of the teachers mentioned that usage of technology in classrooms should be controlled and there should be some restrictions managed by the school. The teachers felt that unrestricted usage of technology, such as iPads, would allow students to access any content they wanted on the internet and also enable them to access the answers to the mathematics problems directly, without them having to learn anything. The teachers mentioned repeatedly the possibility that the students may take inappropriate photos with the devices and upload them to the internet. Apart from this, the distraction provided by the devices was mentioned as a hindrance to the students' concentration on their studies. To this end, they proposed restrictions on the tablets and laptops such that students would only be allowed to access certain websites and apps. Additionally, teachers suggested that the schools provide the devices to the students and not allow them to bring their own to class. One teacher even suggested the Ministry of Education be the authority to supply such controlled devices. Overall, the teachers stressed that

students should be guided and informed clearly about how to use their devices properly as part of education programs.

A positive inclination on the part of the teachers towards online assessment or more simply put, their enthusiasm, is affected by their perception that online assessment is either beneficial to them or beneficial to the students. Benefits to them can include an increased efficiency, improved feedback to them on how their students are progressing, and timely feedback to them about how they are performing as teachers. Benefits to the students include enthusiasm and engagement from them, improved learning and grasping of skills, and enabling students to provide feedback to the teachers that can then result in more tailored lesson plans.

However, the second factor affecting positive inclination is ease of access to technology, which is also important to implementing online assessment. At present, the teachers interviewed in Saudi Arabia stated that they have limited access to the required technology, such as laptops or tablets. They often resort to bringing their own personal devices to class to help the students learn. This is not conducive to a sustained teaching plan and the teachers require the necessary tools and resources to implement online assessment. The required resources could include smart labs, which may be a laboratory in the school filled with the necessary technology, such as laptops, personal computers or tablets, or any combination of the three, that is connected to the internet. However, the recommendation was that the connection be restricted such that only the installed programs may use the internet and unrestricted usage of the internet is not possible. Students and teachers could have a few classes a week directly in the smart labs. The required resources could also include personalized tablets provided to each student and to each teacher. Here again, the tablets would require controls that prevent unrestricted

usage of the internet and avoid the prospect that the students may use the tablets to distract themselves or their peers or use them to cheat the lesson plan.

A negative inclination on the part of the teachers towards online assessment or more simply put, their apprehensions, is affected by their perception that online assessment is either detrimental to them or detrimental to the students. Due to lack of training and information regarding online learning and online assessment, teachers may expect some harmful consequences for themselves or for their students. To overcome this possible apprehension, it is recommended that training for teachers be provided where they would have full explanation concerning online assessment and reassurance that there would be no consequences affecting them or students, and where teachers would receive answers on all possible questions they may have.

Detriments to the teachers can include an increased burden or workload for the teachers, who often already feel overstretched when it comes to their capacity. When teachers feel untrained in the realm of technology, they can also feel that online assessment can be a detriment as the teachers may not be able implement it effectively. Moreover, teachers could become concerned that the students may take advantage of their teachers' lack of knowledge and use the technology inappropriately. Detriments to the students can include distraction in classes, an urge to cheat or use the technology inappropriately or for reasons other than education and a tendency to become overly reliant on the technology, thereby dulling their own skills and defeating the purpose of mathematics education in the first place.

The second factor concerns '*force majeure*' situations where there is a prospect of external obstacles or powerful constraints arising that are outside the control of the teachers themselves. These can include anything from cultural factors that prevent easy

access to technology, to policies enacted by the Ministry of Education in the Kingdom of Saudi Arabia that restrict internet usage amongst young children in schools. Given that many of the schools are also steeped in Islamic values, there may be religious factors that restrict use of technology. While the progress of technology in Saudi Arabia should have no direct impact on religious concepts of the country, there may be some implications in its use or misuse in some circumstances. For example, teachers remarked that some girls might be afraid of the use of technology, such as smartphone cameras, because their photos could be uploaded to the internet, which could negatively affect their reputation according to religious belief. Likewise, unrestricted access to the internet could lead to students viewing or downloading inappropriate or harmful material. Other external obstacles can include parental objections, and lack of budget or resources from the school, as well as other school policies.

According to the teachers' apprehensions, the combination of possible negative consequences of using online assessment and *force majeure* situations could be harmful for students and teachers in mathematics in Saudi Arabia. This means that a mere positive attitude towards online assessment on the part of the teachers may not be enough for them to implement its use. For example, if a teacher has enthusiasm towards using online assessment but is restricted by external factors, such as lack of financial resources or the objections of parents, they may not be able to implement online assessment regardless of their enthusiasm. Similarly, without the easy access to technology, which must be provided by the school, teachers may not be able to implement online assessment in a systematic and sustained way, regardless of their own positive inclination. On the other hand, if both factors, including a positive inclination towards online assessment and easy access to technology come together, it may be possible to implement the online assessment barring external obstacles. Here, if there

is an objection by the parents or a Ministry of Education policy that restricts use of online assessment, the former two factors may not be enough to overcome the obstacles. Ministry of Education in Saudi Arabia may apply restriction policies on the use of online assessment, and then it would be impossible to implement a new project with e-assessment. Thus, current research and relevant scholarly studies are very important, as Ministry of Education in Saudi Arabia takes into consideration latest recommendations in development technology in education in the Kingdom.

Apart from this, if the school enables easy access to technology and implements online assessment as a school policy, but if the teachers are negatively inclined towards its usage, they would have no recourse but to implement online assessment as they are required or mandated by the school to do so. However, their efficacy may be curtailed by their own dislike towards the practice of online assessment, which leads to the conclusion that, for a successful implementation, teachers need adequate training and support, rather than being forced into accepting the technology.

# CHAPTER 6: CONCLUSION

In this research, the series of interviews with six female primary school mathematics teachers in Madinah, Saudi Arabia has demonstrated that their reactions toward online assessment of students were in general positive or even enthusiastic; however, some teachers showed concern about the possible harmful consequences for teachers or students. In particular, they expressed their belief that some negative factors could arise from the use of technology devices and the internet in the classroom that could affect their students in an undesirable way. Therefore, their enthusiasm for online assessment was moderated somewhat by these views, yet they remained positively inclined toward future implementation of assessment using the technology. This is the answer to the first part of the questions of this research study, “What are Saudi primary school teachers’ views about online assessment?”

Considering the theoretical framework and relevant literature analyses, the opinion of teachers is not sufficient in itself to influence the implementation of online assessment. This answers the second question of the study, “How does this influence their decision whether or not to implement online assessment in mathematics?”, as it is clear that these teachers did not feel empowered to decide school policy or to become a force for technological change in assessment methods.

While the teachers may have been generally positive about online assessment, they also viewed as important the need for a number of caveats, rules, and controls to protect students and teachers from adverse effects. They expressed some apprehensions and mentioned several hindrances to the widespread implementation of online assessment in Saudi Arabian primary schools, in particular the lack of investment in professional training for teachers and the necessary investment in equipment and support facilities.

Therefore, without addressing these issues, the positive attitude or inclination of the teacher alone is not enough to assure successful integration of online assessment in the school system. While their enthusiasm may be facilitating, it is only an influencing factor, and not the only influencing factor, yet their willingness to accept and apply the new methods of assessment would be essential to accomplish the introduction to schools. There are implications for government, policy makers and school administrators from these findings, which could make a valuable contribution to a smooth transition to e-assessment for Saudi Arabia's schools.

## Further Study

There are also implications from this study for further research to be conducted on Saudi teachers' attitudes toward e-assessment in particular and, more generally, toward the broader scope of technological change in pedagogical methodology. The sample size of this study was small and localised to the city of Madinah due to time and funding limitations, but it provides a basis upon which to expand the sample size and to seek a clearer picture of the views of teachers across the Kingdom of Saudi Arabia. The study has identified a number of important concerns about online assessment that the teachers had, which could be compared and contrasted with other sample groups, including from other parts of Saudi Arabia, for example in more urbanised or more remote locations, and other levels of schooling, for example secondary schools and universities. Furthermore, studies of the views of male teachers may prove rewarding, as their perspectives may differ from female teachers in the context of Saudi Arabian primary schools. Moreover, it would be important to also understand the viewpoints of the various other stakeholders in education, which could include the students themselves, the parents, school authorities (such as principals) and authorities working for the government in the Ministry of Education. It is clear that obstacles can spring from any

one of the above-mentioned constituencies and therefore all of their views on the subject must be ascertained before any definitive theory can be formulated.

Policy implications of this research suggest that, if there is to be any widespread implementation of online assessment, the issues mentioned by the teachers need to be addressed before proceeding. This is of vital importance as parents, school authorities and government authorities may have the same concerns, especially with regard to restricting access to the internet during school hours and the provision of the necessary resources, tools and training from the school or Ministry of Education.

In order to mitigate obstacles when implementing online assessment, there should be stated effective set of policies and guidelines to enable control and improve efficiency for teachers, improve communication between teachers and students, and enhance student learning without hindering their skills development or causing unnecessary distraction in the classroom.

In conclusion, it can be said that, while this research study has found some answers to the proposed research questions, online assessment in Saudi Arabia is a subject that has been seldom studied. The area requires more scholarly research, especially as the use of information and communication technology becomes ubiquitous and students as young as those in kindergarten or primary school have at least some access to devices such as smartphones and tablets. In Saudi Arabia, as in many countries, it will be important to find ways to utilise the available information technology in productive, innovative and beneficial ways so that the nation can achieve its educational goals for Landmark Vision 2030.

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# Appendix

## Appendix I Ethic approval

Dear Manal,

The Executive Officer of the Social and Behavioural Research Ethics Committee (SBREC) at Flinders University has reviewed and approved the extension of time request that was submitted for project 7757. A modification ethics approval notice can be found below.

## MODIFICATION (No.1) APPROVAL NOTICE

| | |
|---|---|
| Project No.: | **7757** |
| Project Title: | Saudi Arabian Mathematics teacher's beliefs about using online assessment in primary school |
| Principal Researcher: | Ms Manal Alhumaidi |
| Email: | alhu0023@uni.flinders.edu.au; mnolnet@gmail.com |
| Modification Approval Date: | 15 December 2017 |
| Ethics Approval Expiry Date: | **30 December 2018** |

I am pleased to inform you that the extension of time / ethics approval expiry date request submitted for project 7757 on the 9 December 2017 has been reviewed and approved by the SBREC Executive Officer.

| **Approved Modification** | |
|---|---|
| Extension of ethics approval expiry date (ONLY) | X |

## Appendix II Ministry of education approval

[Translated from Arabic]

Royal Embassy of Saudi Arabia
Cultural Attaché Office
Canberra
TASK FACILITATING STATEMENT

Date: 16/08/2017

**To Whom It May Concern**

The Cultural Attaché's Office at the Royal Embassy of Saudi Arabia in Australia hereby states that Ms. Manal Abdulrahman Hassan ALHUMAIDI, a scholarship student, (National ID No: 1034820421) has been delegated by the Ministry of Education to study for her Master Degree, majoring in **Evaluation, Measurement and Research** at the Flinders University. Her delegation started on 20/01/1435 H. corresponding to 23/11/2013 AD, and should end on 27/03/1439 H. corresponding to 15/12/2017.

And due to the delegated student's need to collect information related to her Master's Degree studies from the kingdom and the recommendation of her academic supervisor at the university in this regards, we anticipate from the concerned authorities to kindly assist the abovementioned delegate and to facilitate her mission in collecting the required information for educational research purposes.

This information is correct in accordance with the educational system data at the abovementioned date. This statement has been issued to the delegate upon her request.

God is the provider of success.

The Cultural Attaché at the Royal Embassy of Saudi Arabia in Canberra
*(signature)*
Dr. Hisham Abdulrahman Khadawardi
*(Official seal of the Royal Embassy of Saudi Arabia, Cultural Attaché Office – Canberra)*

**Appendix III Teacher letter**

Dear participant,

My name is Manal Alhumaidi. I am maser's student at flinders

University in Australia. I am doing a study about Saudi Arabian mathematics teacher's view about using online assessment in primary schools'. The purpose of my study is to investigate your view about using online assessment tools in mathematics classes.

The research finding will provide an improved understanding about how technology (online assessment tools) can be used in a better way to enhance students' interest in learning, and to promote their achievement.

Your role will involve answering a few questions. Your participation is voluntary, and all the information will be anonymous. You can withdraw any time from the interview if you feel uncomfortable.

Best Regards

Manal

**Appendix IV interview questions**

<table>
<tr><th colspan="2">Proposed Interview Questions</th></tr>
<tr><td colspan="2">1. How long have you been teaching?<br>2. What age level do you teach?<br>3. What is your teaching specialisation?<br>4. How do you feel about teaching mathematics?<br>5. What do you believe is the main purpose of assessment in mathematics?<br>6. What do you think is most valuable about assessment in mathematics?<br>7. What do you know about online assessment in mathematics?<br>8. Have you us online assessment in mathematics?</td></tr>
<tr><td>Yes:<br>What type of online assessment do you use?<br>How long have you been using online assessment in mathematics?<br>What do you believe are the strengths/weaknesses related to online assessment in mathematics?</td><td>No:<br>Why do you not use online assessment in mathematics?<br>If this was not the case would you use online assessment in mathematics?</td></tr>
<tr><td colspan="2">Is there anything you would like to add?</td></tr>
</table>

**Appendix V. Teachers' answers regarding purpose/value of assessment.**

AYA: Evaluation provides me with evidence of understanding and proof that they can apply the required rules. I don't care about their skills so much, as long as they are able to understand the concept which only happens if they understand the rules.

AYA: I feel I know when the students understand, regardless of how experienced or insightful I am.

AYA: It is mainly to review students' progress, check the student level, and to see if she has mastered the skill.

LAMA: I can't move on to teach them another skill until I have assured that they understood my class.

AYA: Looking at our assessment system, the students here have the right to be assessed [summative] up to three or four times. However, I would give her a chance until she understands.

HANA: For students, it is important because I have to know if they have improved before I move onto another lesson.

HANA: I have to assess the students many times until they understand.

DAAD: We assess students to make sure that they have mastered the skills, and for the teacher to be satisfied that they know where the weakness points are and for them to start from that; then to try to find an alternative plan.

NUR: To know and make sure that students understand and have learned. Without the assessments how will I know?

NUR: It helps to gauge whether or not the students can go to another level.

SARA: It is to see how they improving and to make sure am teaching on the right path.

LAMA: It gives me an indicator on the quality of my teaching and if I need to change the style of delivering the information.

HANA: Also the other purpose of assessing students is to see how good my teaching has been.

DAAD: Also for me to know whether or not my teaching is effective or if I need to find another way to explain things - should I get training in how to explain things very well, should I use teaching aids

NUR: To make sure that a student deserves to go to the next level.

**Appendix VI. Teachers' answers regarding practice of assessment**

AYA: I use short exams, work papers, tasks and projects and observation of the student groups. Sometimes I grade them in groups and sometimes individually.

AYA: Grading them in a group would make it better as they learn from each other too.

AYA: I guess I could use peer assessment. It is a strategy that could be used, but not in all cases. It is easier to use it in a higher class.

AYA: We use it through self-assessment which they deliver to us.

DAAD: Every day, in the last five minutes of my lesson I ask them to solve an activity about the lesson in the activity book.

DAAD: I have a skills paper which I put in the first page of the book. If the student masters a skill first time I put a tick. Otherwise, I let her to do it again until she masters it. I usually give them three or four chances and usually they master it after the second or third time.

NUR: I use many ways including worksheets and the math book and the activity book.

SARA: Continue assessment during the lesson by giving them daily test, and how thy active during the class also I give them homework to do, and mark there work individual and group. Also, I use math book and activity book.

SARA: Always after each lesson, I give them a short test at the end. And, I give this test until they rich the level of skills.

LAMA: There is a verbal assessment in class, worksheet and written assessment sometimes.

AYA: I use work papers, group tasks and the student book and the workbook. I also give them an assessment book daily so they can get better.

HANA: Projects, a student's attendance, brochure, doing homework, her attention in the class, but for me I have to give her a test to make sure she understands.

HANA: At the end of every chapter, I give them a test about the skills introduced in this chapter. In addition, I use observation in class, homework, class works and other activities such as projects or brochures.

HANA: For assessment for learning, during the class I organise my schedule such that three classes learn new material and one class does activities related to all the previous classes. I explain the topic and ask one of the students at random to do the activity on the board, and the rest to do it in their book. If she makes a mistake, I will ask the rest of the class to correct it, and to correct in their books.

**Appendix VII. Feedback of Assessment**

DAAD: I have a skill paper which I put in the first page of the book. If a student masters a skill first time I put a tick. Otherwise, I let her to do it repeatedly until she masters it. I usually give them three or four chances and usually they master it after the second or third time.

SARA: And for me, I know from their achievement and their results whether I am doing well or not. If most of them fail, this means that I didn't do very well and I need to change my way.

SARA: After each lesson, I always give them a short test at the end and my feedback to the student by fail or pass and I give this test until they reach the level of skills.

AYA: Feedback from the assessment will tell me what this girl does not understand, it might be that my explanation or my strategy does not work, or it might be that she has family issues.

HANA: I give them many questions and they get a percentage score.

HANA: Each time we test a student we decide if she understands and is able to move to the next level, or if she needs more work and explanation and more activities to learn.

LAMA: In each semester, we have a worksheet to be given to students that examines their level. Another worksheet is provided at the end to make sure students have developed and learned.

**Appendix VIII. Teachers' answers regarding Attitude towards Online Assessment**

HANA: It is fantastic [she looks really encouraged!] I was impressed with the students' achievements and confidence, and also because the teachers there were more professional.

HANA: Now we are in the iPad\iPhone age. Children today know more than us. They know how to search, download and share in the social media. Why don't we take advantage of this since it is in the students' interest?

HANA: Instead of using this device [iPad] for watching YouTube and playing games, we can use it in a more beneficial way.

HANA: I will be the first one to use it [iPad] in addition to the textbook and the activity book. … It saves the teacher time, and the students can do it many times at any time. Also, it gives the students feedback immediately, which is good. So, all the class will not be using only the book but the book and the iPad together to make it easier and more enjoyable.

HANA: …[S]o mathematics is a little bit hard, but with this way it will make it easier.

DAAD: It is wonderful, and the students like it a lot. I use it to break the routine.

DAAD: The only difference is that technology learning and assessment tends to be more enjoyable and I think students like it better than using test papers.

NUR: They like using iPads. It is also a more efficient way.

AYA: Students become more confident and we should speak to them using the language of the age, which is the technology age.

AYA: Also students become stronger when they speak about what they explore and find. They feel proud about every search and something they watched and want to share it with their teacher and peers.

SARA: It [online assessment] takes less time and less effort. I don't have to do any printing stuff and copy papers as we pay a lot of that.

NUR: It [online assessment] would be more helpful if a teacher is from another field [non-math background]. It would make teaching/learning as well as marking a much easier job.

NUR: I use the internet to search and find new ideas about teaching to improve myself in terms of how I teach.

HANA: It [online assessment] saves time and effort, because when I divide my classes into semester weeks, there is no time for assessment…Either I need additional time [than the given 45 minutes per class], or I have to be very brief [without providing more description & examples].

**Appendix IX. Teachers' answers regarding applications and programs used for online assessment**

DAAD: I used an app [PLICKERS] on my phone which has random questions, and they answer these questions…I have a system called Classera [an online platform]. I post questions and they answer them. But, there is a big difference in the students' results when I use Classera and paper tests [suspicious about whether students cheat online assessment]…Classera is a system on which the teacher posts questions, activities, share YouTube and add attachments. Also, I can email students and their parents…I'm using an app called PLICKERS where each student has a unique code. When the student chooses the right option, the app corrects that by scanning.

AYA: I used Google drive with the student forums…I provide them with a document on Google that has links that can help them, such as YouTube lessons, website lessons and more of these types of things. So, they know that when they go home they have a task on Google docs and they have to use these resources to solve it…Students from Saudi, Kuwait, UAE and Egypt login to online competitions through the website [website: Afkar Alreiadiat]. They answer questions and get weekly updates about how well they did. It has an immediate feedback system, which is a very good aspect of it. By the end of each week, the top ten students get a certificate of excellence. It is quite a motivating and rewarding activity.

NUR: I use my iPad sometimes to show them YouTube.

SARA: I put my students' names in an app called Roller. This app chooses students randomly and provide them with a random list of questions [like a

quiz]. When a student's answer is correct, it adds the points each student makes, and finally selects a winner [with the highest point].

LAMA: There was this app [can't exactly tell the name of that app] that let them randomly answer questions and they feel really happy with it. One of the teachers uses it daily. Students feel upset when the teacher does not bring it. It creates a sense of competition among them.

HANA: At the moment, I use only an iPad in my class. I use the iPad in my class by linking it with the projector, but not all the time since time is limited.

DAAD: I use an iPad in my class…

LAMA: I did bring my own iPad to class a few times where the students can gather and work on some of the math application.

## Appendix VI. Teachers' answers regarding resources for online assessment

HANA: If they [schools] offer special labs or special classes using iPads, we could call them smart classes, and each class could use them once or twice a week to make it more enjoyable for the students.

NUR: Yes, this is great (referring to implementation of smart lab), as much as still serves the same goal.

SARA: If they offer a special lab at school it will be a great idea. If they offer iPads for every girl under the teacher's guide it will be better.

## Appendix VII. Apprehensions of Implementation Online assessment

NUR: Using the internet, a student learns by practising multiple choices. The marking is electronic, so the computer will not mark the steps. It will work with high school students. Still, I think it is better to do a paper test in primary schools…

AYA: When you provide them with the book online, they might lose their ability to write and might lose other skills and become dependent on technology…

Some apps are destructive. Some apps called (HOLLOL), offer the questions' solutions so that students do not need to do anything. Students won't learn anything as they will become dependent on it. This kind of app dulls students' minds as all of them just want to copy without any thinking…

HANA: Using the internet and special apps to assess the learning of the students will be an excellent idea, especially nowadays. But, it must be the school that offers this with control, so that students can't access any unwanted sites/portal they want.

DAAD: The idea of assessing students via internet is great, but not all the time, especially in primary school. It may well be easier in high school or university. It is good to use it once or twice a week for students' enjoyment. To use it to complement the book, but not alone.

**Appendix VIII. Teachers' answers regarding resources/budget hindrances.**

DAAD: In private schools, students are more confident because they have more facilities. They have their own online account [called CLASSERA] facilitated by the school. They email their teachers, get learning resources, they can receive any announcements [something like an online forum].

SARA: We can't provide [the smart device] to every single one of them because it's a public school. And, not all families are able to buy smart devices…Yes, everything is free in public school, but there is no budget for smart devices. And, I can't guarantee that their [students'] family can buy a smart device…The number of students is too high, there is no device for every single girl.

HANNA: The school has no facilities. We don't have any smartboards. The budget is not enough.

**Appendix IX. Teachers' answers regarding lack of teacher training and inadequate classroom time to practice online assessment**

DAAD: I can't use it all the time. With the number of students [40 students in one class] I have, the lesson time of 45 minutes is not enough.

NUR: But, I don't know how to assess students in math using the internet… They must offer teacher training. They must reduce number of students in the classroom. They must offer laptops or computers for each student.

LAMA: I need training. There are many features that I don't know how to use. For example, they brought smart boards into school but they didn't teach us how to use it.

SARA: The time is not enough to add more activities as the book [math] is too long and has a lot of activities to be done.

**Appendix X. Teachers' answers regarding cultural appropriateness**

HANA: It is something beyond my control. It may be that they [female students] are afraid, they [students] might take photos and share them on the internet.

NUR: Teachers and staff are afraid of taking photos and sharing them on media.

AYA: They could use them during other classes to play games and lose focus in the class. Not to mention accidents…They take pictures together. I don't have a special place for them or a resources room in the school.

SARA: Apps must be created according to the math curriculum and must be controlled by the school so students can't access anything else.