TEACHERS' PERCEPTIONS OF ASSESSMENT PRACTICES IN MATHEMATICS:

COMPARING RURAL AND URBAN SECONDARY SCHOOLS IN ENGLAND

by

Michael George Jarrett

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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ABSTRACT

This causal-comparative study compared the mean scores on the measures to determine if there were differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. The study comprised 109 participants selected by a random sampling method. The sample consisted of 53 mathematics teachers from urban secondary schools and 56 mathematics teachers from rural secondary schools drawn from a population of secondary school mathematics teachers in England. The Assessment Practices Inventory (API) was used to collect data from the participants in the study. The independent sample t- test was used to analyze the data in the study. The study determined that statistically significant differences exist in perceived frequency of usage of classroom assessment practices between mathematics teachers in urban secondary schools (M = 193.02, SD =72.78) and mathematics teachers in rural secondary schools in England (M = 157.84, SD = 58.25); t (107) = 2.794, p = .006. Mathematics teachers in urban secondary schools were found to have perceived themselves as using the surveyed assessment categories more frequently than mathematics teachers in rural secondary schools in England, with a moderate effect size (d = .53). The study also determined statistically significant differences in perceived skill in usage of classroom assessment practices in mathematics between mathematics teachers in urban secondary schools (M = 179.54, SD = 75.76) and mathematics teachers in rural secondary schools in England (M = 146.20, SD = 60.96); t (107) = 2.539, p = .013. Mathematics teachers in urban secondary schools were found to perceive themselves as more skilled in using classroom assessment practices than mathematics teachers in rural secondary schools in England, with a moderate effect size (d = .48)

Keywords: urban teachers, rural teachers, perceptions, classroom assessment practices.

DEDICATION

This work is dedicated to my family, siblings, and friends. Firstly, to my parents who brought me into the world. To Mr. Wilfred Jarrett, my wonderful father who never lived to see this day. If it was not for your love, guidance, and support I would not have made it to this point. I missed you dearly. To Ms. Hazel Brown, my guiding star, my motivator and a wonderful mother: without your love and support I would not have finished this huge milestone. Your words of encouragement, love, and support have sustained me for my lifetime. I love you mother. I hope I have made you proud.

Next, this work is dedicated to my wife, Millicent Almarine Jarrett, you have planted this seed. You have researched and found Liberty University and suggested that it is the best university to support my doctoral studies. You are absolutely correct. Thanks for your love, support, and understanding throughout this journey.

Finally, I would like to dedicate this work to all unmentioned family members and friends. Thank you all for your prayers, love, and support. I hope I have made you all proud.

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Alternative Provision (AP)

Assessment Practices Inventory (API)

British Education Act (BEA)

Department for Education (DfE)

European Union (EU)

General Certificate in Secondary Education (GCSE)

General Teaching Council of England (GTCE)

Local Education Authority (LEA)

Office of National Statistics (ONS)

Office of Standards in Education (OFSTED)

Pupil Referral Units (PRU)

Qualified Teaching Status (QTS)

The Technical and Vocational Education Initiative (TVEI)

CHAPTER 1: INTRODUCTION

Background

The integration of classroom assessment practices into the secondary schools' curriculum became an essential component of teaching and learning in 1923 with the Hadow report that argued for differentiated and personalized curriculum instructions for students at the secondary level (Office of Standards in Education, 2014). The reform of secondary education which resulted in the launch of the British Education Act in 1944 increased public acceptance of classroom assessment practices as an essential feature in promoting the quality of teaching and learning within the secondary education system in Britain (Office of Standards in Education, 2014). This was followed by the presentation of the Cockcroft report in 1982 which argued for the application of classroom assessment practices in the teaching and learning of mathematics across all age ranges in Britain. The Technical and Vocational Education Initiative (TVEI) in 1983 has also contributed to the reform of the secondary education curriculum in Britain.

The addition of classroom assessment as a fragment of curriculum standards was also given legislative approval with the launch of the Education Act in 2011, which emphasized the importance of classroom assessment in the planning and delivery of lessons (Department for Education, 2012). These sections of legislation have contributed significantly to the changes that were implemented in the secondary schools' mathematics curriculum in 2012. These changes in curriculum standards have also led to the acceptance of classroom assessment practice as pieces of quality assurance evidence used in assessing the standard of teaching and learning in schools (Office for Standards in Education, 2014).

Researchers, such as Alkharusi, Aldhafri, Alnabhani, and Alkalbani (2014) have made significant contributions to the field of education, particularly in the field of classroom assessment

practices. Findings from these studies have provided educators with the requisite knowledge and skills needed to better understand the impact of classroom assessment practices on students' learning and progress in the classroom (Allen, et al., 2013). Furthermore, these results have shown that a direct link exists between the quality of classroom assessment practices and the level of attainment in the classroom (Dixon, 2011).

A new national curriculum in mathematics was introduced at the secondary school level in 2010. The curriculum was introduced to address the growing concerns regarding the steady decline in mathematics over previous years. The new General Certificate in Secondary Education (GCSE) mathematics curriculum now requires mathematics teachers to be more creative in their approach to the acquisition of skills and content delivery. In general, the new curriculum demands a more rigorous approach to classroom assessment across all age and ability ranges, in relation to their prior attainment, and in line with their key stage trajectory (Office for Standards in Education, 2014).

These significant national curriculum changes, specifically in the area of classroom assessment practices, necessitated current research on teachers' perceptions of assessment practices in mathematics for a myriad of reasons. Many researchers, such as Allen, et al. (2013) suggested that a direct relationship exists between the attitude of a teacher and the quality of teaching and learning in mathematics (Allen, et al., 2013). The researchers suggested that teachers' attitudes toward teaching have had an impact on students' attitudes toward learning, which ultimately have impacted on students' achievement in mathematics (Elkatms, 2012). Ogunkola, and Archer-Bradshaw (2013) have also suggested that a direct relationship exists between teachers' attitudes towards the use of classroom assessment strategies and the quality of teaching and learning in the mathematics classroom. The researchers posited that teachers'

attitudes influence pedagogic performance, which in turn influences the quality of learning and progress in the classroom (Stiggins, Conklin, & United, 1992).

Current changes to the national curriculum standards in mathematics; public sector wage packages; students' achievement in mathematics at the secondary school level; the impact of social, cultural and environmental factors; and the impact of geographic settings could change the way teachers' perceived classroom assessment practices occur in mathematics across England.

Problem Statement

The problem that this study sought to address is that teachers' perceptions of the frequency of usage and their perceived skill in usage of classroom assessment practices in mathematics at the secondary school level have not been measured in England. Examining the perceived frequency of usage and the perceived skill in usage of classroom assessment practices in mathematics between mathematics teachers in rural secondary schools and mathematics teachers in urban secondary schools will add to the body of knowledge surrounding the use of classroom assessment practices in mathematics. The study compared the mean scores on the measures to determine if there were statistically significant differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices in mathematics between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. The results from the study have provided a clear indication that there are statistically significant differences of perceptions between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England.

Several existing studies have signaled the need for more research in the area of classroom assessment practices in mathematics (Office for Standards in Education, 2014). Antoniou and James (2014) have encouraged future research in comparing the differences of teachers'

perceptions to classroom assessment practices in mathematics. For the purpose of this study, teachers' perceptions of classroom assessment practices were defined by the researcher as the combination of perceived frequency of usage and perceived skill in usage of classroom assessment practices. Antoniou and James (2014) have also stressed the need for effective classroom assessment practices to be entrenched in mathematics and have beckoned the need for consistency in the application of classroom assessment practices in the secondary schools' mathematics curriculum (Antoniou & James, 2014). Furthermore, a recent report published by the Office for Standards in Education (2014) has further endorsed classroom assessment practices as essential tools used for narrowing the gaps between low and high academic achievers.

Ultimately, it is the responsibility of teachers to empower all students to succeed in the classroom. Consequently, there is a need to examine teachers' perceptions of classroom assessment practices in mathematics as a means of improving students' achievement in mathematics (Office for Standards in Education, 2014). This study in the area of curriculum and instruction will help to fill the need for additional research on teachers' perceptions of classroom assessment practices in mathematics.

Purpose Statement

The purpose of this causal-comparative study was to compare the mean scores on the measures to determine if there were statistically significant differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. The independent variable of interest for the study was defined as urban/rural classification (urban and rural secondary school mathematics teachers) in England. The dependent variable of interest for the study was defined as perceived frequency of usage and

perceived skill in usage of classroom assessment practices in mathematics as measured by the Assessment Practices Inventory (API). The study comprised 109 participants selected by the random sampling method. The sample consisted of 53 mathematics teachers from urban secondary schools and 56 mathematics teachers from rural secondary schools in England. The participants were drawn from a population of mathematics teachers from rural and urban secondary schools in England. The participants included in the study have attained a minimum of two years teaching experience and are recognized as fully qualified mathematics teachers by the General Teaching Council of England.

Significance of the Study

Measuring teachers' perceived frequency of usage and perceived skill in usage of classroom assessment practices in mathematics is crucial as teachers' perceptions of classroom assessment practices can have a detrimental effect on the outcome of students' achievement in the classroom (Alkharusi, Aldhafri, Alnabhani, & Alkalbani, 2014). In addition, measuring teachers' perceptions to teaching and learning is also important as it gives researchers the stage for examining the changes in perceptions that are taking place in the classroom (Office for Standards in Education, 2014). Similarly, measuring the quality, effectiveness, and significance of classroom assessment is vital in assessing the result of teachers' assessment practices on students' achievement in the classroom (Allen, et al., 2013).

Previous research on teachers' perceptions suggested that teachers' readiness to change plays an important role in the execution process (Shriner, Schlee, Hamil, & Libler, 2009). Consequently, exploring research in the area of classroom assessment practice is important as it will afford educators the opportunity to use systematic evidence to inform decisions at the appropriate level. This research will also be valuable to other educators who are interested in

professional development. Furthermore, comparing the differences of perceived frequency of usage and perceived skill in usage between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools is essential when considering curriculum development for pre-service teacher education programs. Finally, this research will not only add to the body of existing knowledge on classroom assessment practices but will also offer insights to other researchers who are concerned about the use of classroom assessment practices by teachers in different geographic settings.

Research Questions

The following research questions and associated null hypotheses were used to guide the study:

RQ1: Is there a difference in perceived frequency of usage of classroom assessment in mathematics (as measured by the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England?

RQ2: Is there a difference in perceived skill in usage of classroom assessment practices in mathematics (as measured by the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England?

Hypotheses

H_01a: There is no statistically significant difference in perceived frequency of usage of classroom assessment in mathematics (as measured by the overall results of the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England.

H_01b: There is no statistically significant difference in perceived frequency of usage of classroom assessment in mathematics (as measured by the mean scores from the categories of the

Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England.

H$_0$2a: There is no statistically significant difference in perceived skill in usage of classroom assessment practices in mathematics (as measured by the overall results of the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England.

H$_0$2b: There is no statistically significant difference in perceived skill in usage of classroom assessment practices in mathematics (as measured by the mean scores from the categories of the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England.

Definitions

In an attempt to maintain consistency and uniformity of understanding throughout the study the following definitions are provided:

1. *Assessment for learning*: Assessments for learning are classroom assessment strategies used by educators to measure the impact of teaching and learning in the classroom (Office for Standards in Education, 2014).

2. *Differentiated learning*: Differentiated learning is specified assignments given to specific individuals in an attempt to assist students in meeting their individual learning goals (Office for Standards in Education, 2014).

3. *General Certificate in Secondary Education (GCSE)*: General Certificate in Secondary education is an accreditation achieved at the end of secondary education.

4. *Mathematics teacher*: Mathematics teacher is an educator who has successfully

met all the mathematics curriculum standards set by the General Teaching

Council of England and is qualified to teach mathematics in England,

Scotland, and Wales (Department for Education, 2012).

5. *Overall Perceived frequency of usage of classroom assessment*: Overall

Perceived frequency of usage of classroom assessment is the sum total of the

scores measured on the "frequency used" section of the API

6. *Overall Perceived skill in use of classroom assessment*: Overall Perceived skill

in use of classroom assessment is the sum total of the scores measured on the

"skill in use" section of the API.

7. *Perceptions*: Perceptions is one's interpretation or understanding of a

particular phenomenon. For the purpose of this study, perceptions will relate

specifically to teachers' interpretation or understanding of classroom

assessment practices.

8. *Perceived frequency of usage of classroom assessment*: Perceived frequency of

usage of classroom assessment is the beliefs held by a teacher about the

frequency at which classroom assessment practices are implemented in their

own teaching.

9. *Perceived skill in usage of classroom assessment*: Perceived skill in usage of

classroom assessment is the beliefs held by a teacher about their ability to

conduct classroom assessment well during their own teaching.

10. *Qualified teaching status*: Qualified teaching status is an endorsement

provided by the General Teaching Council of England that proves that the

educator has successfully met all the teaching standards in England

(Department for Education, 2012).

11. *Rural mathematics teachers*: Rural mathematics teachers are teachers that are working in schools in England that are categorized as rural schools by the Office of National Statistics in England.

12. *Rural school districts*: Rural school districts are categorized as schools that are confined in the rural geographic areas of England. These boundaries are identified from the information provided by the Office of National Statistics (Department for Education, 2012).

13. *Teachers' perceptions to classroom assessment practices:* For the purpose of this study, teachers' perceptions to classroom assessment practices is defined as combination of their perceived frequency of usage and perceived skill in usage of classroom assessment practices.

14. *Urban mathematics teachers*: Urban mathematics teachers are teachers working in schools in England that are categorized as urban schools by the Office of National Statistics in England.

15. *Urban school district*. Urban school district are schools that are categorized as schools that are confined in the urban or built up areas of England. These boundaries are identified from the information provided by Office of National Statistics (ONS) based on the 2011 census data (Department for Education, 2012).

CHAPTER 2: LITERATURE REVIEW

Introduction

This chapter will thoroughly examine the accessible literature relating to teachers'

perceptions of classroom assessment practices. Current legislations and government policies have

contributed to the changes in the secondary school mathematics curriculum and the way

classroom assessment practices are perceived by educators today. Those changes have prompted

a divide in teachers' perceptions concerning the use of classroom assessment practices in lessons.

Those shared perceptions and practices are the impetus for this study. The chapter will begin with

a clear outline of the theoretical framework that supports this study. The chapter will continue

with a review of the literature pertinent to the issues relating to teachers' perceptions of classroom

assessment practices. The summary of the literature review will conclude this chapter. The

summary will provide a synopsis of the importance of classroom assessment practices and offer

an explanation of its significance in addressing the gap in the literature.

Theoretical Framework

The concept of classroom assessment became a fundamental part of teachers' practice

long before the publication of the Hadow report (1923), British Education Act (1944, 2011), the

Cockcroft report (1982), and the Technical and Vocational Education Initiative (1983).

Nonetheless, this legislation proved to be most influential with regards to both the quality of

assessments students experienced at the secondary school level as well as the perceptions of

classroom assessment practices by educators. This legislation required the integration of

classroom assessment strategies into the curriculum standards to be used to develop and monitor

teachers' effectiveness.

While the idea of classroom assessment was not new, this legislation required the actual practice to be evident in the teaching and learning environment. Classroom practitioners are now expected to use classroom assessment strategies in a variety of ways to enhance the quality of teaching and learning (Cheng, Rogers, & Hu, 2004). Consequently, teachers of mathematics are expected to incorporate classroom assessment strategies in their lessons in order to effectively monitor the levels of progress made by students.

While government legislation provides a fundamental theoretical framework for this study, the following theories also acts as a firm support for this study: Vygotsky's theory of cognitive development; Bandura's Social cognitive theory; and Skinner's theory of operant conditioning.

Vygotsky's Theory of Cognitive Development

Vygotsky's cognitive development theory posited that teaching and learning is an active process, whereby members of the social community continue to play a vital role in the teaching and learning environment (Vygotsky, 2011). The social constructivist strongly believed that children learn through active interaction within their environment. Through this interaction knowledge can be transferred from the adult to the child. Vygotsky (1962) further stated that this interaction process is very important as it serves to facilitate the process of learning (Rutland & Campbell, 1996). Vygotsky (1962) further stated that language is the most important tool through which knowledge can be learned. For this reason, Vygotsky believed that children can learn from other people, such as teachers, parents, and even their peers (Vygotsky, 2011). This approach to teaching and learning is common in the constructivist classroom and is a key feature of outstanding teaching.

Vygotsky's theory of cognitive development suggests that students learn new concepts best when struggling in the zone of proximal development. The introduction of new concepts in

this manner provides opportunities: to scaffold instruction; for higher order questioning; teacher modelling; and instruction by more knowledgeable peers through social interactions within the classroom setting (Tice, 1997). In addition, active learning strategies which engage students can be used prior to the introduction of new concepts to support student struggle in the zone of proximal development. Such strategies include the following: deconstruction of challenging text or images; prediction activities; and analysis of aspect of style, language, and form in a range of subjects. Strategies such as these move students from the zone of comfort, and as a result they are more likely to learn effectively (Chen, Crockett, Namikawa, Zilimu, & Lee, 2012).

Vygotsky's theory also plays a vital role in understanding the importance of assessment for learning. Through an understanding of the link between success criteria and learning objectives, teachers are better able to differentiate between the two and subsequently plan for progression within their classroom (Chen, Crockett, Namikawa, Zilimu, & Lee, 2012). Consequently, the use of classroom assessment strategies will be more evident in the learning environment and its effectiveness will enhance the quality of teaching and learning in the classroom. In addition, very little time will be wasted in most lessons, and smooth transitions between activities will allow for better understanding of concepts in the classroom (Jones & Jones, 2013).

Social Cognitive Theory

Social cognitive theory posited by Albert Bandura also provides a framework for this study. Albert Bandura's social cognitive theory suggests that children learn by observing or by

imitating others within the social environment (Bandura, 2001). Bandura's social cognitive theory consists of three components: person, environment, and behavior. The person refers to the observer, the environment refers to the social settings, while the behavior refers to the improved learning conditions (Bandura, 2001).

Bandura's social cognitive theory further suggests that by creating a positive learning environment teachers are better able to challenge students and provide frequent feedback (Boyce, 2011). From this perspective, social cognitive theory provides the basis for frequent and effective use of classroom assessment strategies. Through this type of interaction students might be able to learn the desired behavior and practice the required skills at the appropriate level. This type of behavior can be learned either through observation or by modelling. Through observation students can learn the desired behavior provided by the teacher or by modelling the desired behavior provided by a peer functioning at a higher level on the required skills (Boyce, 2011). A study conducted by Blair (2004) demonstrates the importance of social learning theory in the classroom. The article suggests that peer interaction in mathematics enhances faster progress through collaborative interaction within mathematics lessons. Through this type of interaction students are better able to model the required behavior within the social setting (Blair, 2004).

Skinner's Theory of Operant Conditioning

Skinner's theory of operant conditioning also forms the basis of this study. According to Skinner, operant conditioning is the use of consequences to modify the occurrence of a particular behavior (Pitts, 1971). The use of classroom assessment in the classroom promotes the use of consequences through dialogue and feedback. Teachers in the mathematics classroom can use consequences to monitor students' progress towards the targeted outcomes. Furthermore, classroom assessment strategies should be used to break down more difficult and challenging

learning tasks into simpler, student friendly and more meaningful tasks (Isaken & Holth, 2009).
Consequently, this approach to the use of classroom assessment in mathematics can help students
to identify the link between different mathematical concepts, thereby achieving their age related
and predicted targets.

Skinner further stated that through constant dialogue and use of feedback, the desired
behavior can be achieved by learners (Isaksen & Holth, 2009). This theory supports the use of
assessment for learning and differentiated learning in the classroom. Through this approach
complex tasks can be broken down into simpler ones where regular interventions and support are
provided to monitor progress. In addition, praises and rewards may be provided as a means of
providing incentives for achievement of smaller tasks and a motivator for higher tasks (Jones &
Jones, 2013).

Related Literature

History of Classroom Assessment

The reform of secondary education in the 1940's gave birth to a new approach to teaching
and classroom assessment practices in Britain. This new development in the area of education has
led to the implementation of a new and innovative approach to classroom assessment practices in
the areas of teaching and learning (Office of Standards in Education, 2014). These innovative
alternative classroom assessment practices have been supported on the basis that they produce
more active, reflective, and critical thinkers in the classrooms (Office of Standards in Education,
2014).

These alternative classroom assessment practices have been known to provide educators
with a wealth of knowledge and skills on the different approaches that should be used to assess
students learning in the classroom (Zacharos, Koliopoulos, Dokimaki, & Kassoumi, 2007).   As

the curriculum changes, teachers are encouraged to change their focus and adopt a more contemporary approach to classroom assessment. The changing perspective is supported by the need to use classroom assessment strategies to promote a better quality education for all learners in the classroom. This focus is in keeping with national priorities in closing the gap between the most abled and disadvantaged learners (Office of Standards in Education, 2014).

The Role of Classroom Assessment

The concept of classroom assessment is wide and varied and encompasses a range of classroom assessment activities ranging from testing and grading, to interpreting and communicating the test results and using the test results in making assessment decisions. Although some educators embrace the more traditional forms of classroom assessment practices such as paper-based multiple choice objective tests and standardized tests, there are many educators who embrace a more contemporary approach to classroom assessment practices such as research activities, open book testing, group assessment activities, essay writing, and portfolio-based exercises (Kubiszyn & Borich, 2013). In light of these findings, it has been suggested that some traditional forms of classroom assessment practices are more effective in assessing subject knowledge, skills acquisition, and mastery of content. Whereas, some contemporary assessment practices prove to be more effective when assessing deeper understanding of subject content and applications of skills (Kubiszyn & Borich, 2013).

Teachers are in control of classroom assessment strategies as they ultimately determine how to assess and when to assess within the classroom (Campbell & Evans, 2010). With this view in mind, teachers hold and play a critical role to the quality of teaching and the levels of attainment achieved by learners within the classroom. Teachers' classroom assessment strategies have impacted significantly on the quality of teaching and learning in the classroom (Isaksen &

Holth, 2009). Through effective classroom assessment practices teachers will be able to make informed decisions about the quality of teaching, the level of progress, and learning in the classroom (Office of Standards in Education, 2014). Teachers, school administrators, and other educational professionals are the main users of classroom assessment data and as such should make sound and effective decisions when using classroom assessment data. Campbell and Evans (2010) found that the effective use of classroom assessment practices by educators is crucial to the level of learning and progress within the classroom. Furthermore, effective classroom assessment strategies are crucial to the overall effectiveness of the quality of teaching, behavior and safety, levels of attainment, leadership, and management within the educational establishment (Office of Standards in Education, 2014).

Classroom Testing Practices

Through classroom testing and measurement many educators are able to accurately assess students' working knowledge in many areas of the curriculum (Kubiszyn & Borich, 2013). Although classroom testing and measurement is critical to the assessment of students' academic success, there are many educators who are divided on such perceptions. Furthermore, some educators are of the view that mandated high stakes testing can lead to classroom instructions that contradicts a teacher's values and beliefs about teaching, learning, and classroom assessment practices (Abrams, Pedulla, & Madaus, 2003).

Recent studies in the area of classroom testing and measurement demonstrate that frequent testing and examinations in the classroom can prove to be very difficult and stressful for some learners (Ramirez, & Beilock, 2011). The study further revealed that students who have less interest in testing and external examinations have performed worse in test and external examinations than their peers who generally enjoy testing and examinations in the classroom

(Ramirez, & Beilock, 2011). A similar study was conducted by Hanson and Carpenter (2011) examining the effect of cooperative learning strategies on classroom testing and the implications for nursing education and practice. The study revealed that cooperative learning strategies had positive effects on students' critical learning and thinking skills in the nursing classrooms (Hanson, & Carpenter, 2011). Furthermore, the study revealed that in general group assessment, portfolios and other contemporary classroom assessment strategies have a more positive effect on students' achievement in the classroom than frequent testings and external examinations.

Classroom Grading Practices

The concept of grading in the classroom is widely used and accepted in the area of curriculum and instruction in many countries around the world. Although grading is a very important tool used to assess students' progress in the classroom, grading systems are meaningless unless they are used for the purpose intended. Consequently, grading systems have no merit unless they are applied within the context of the educational system (Nagel, 2015). For this reason, teachers should be mindful of the purpose of the grading system, how the grading systems will be used, and how the grades will be applied to determine the level of progress achieved by each learner in the classroom. In addition, the grading system should be designed to meet the needs of teachers and students alike. Furthermore, the grading system should be applied to accurately reflect the level of attainment and progress achieved by each learner in the classroom (Rowtree, 1987).

McMillan, Myran, and Workman (2002) argued that grading students' work can be difficult as grading takes time and involves the consideration of a number of external factors. These external factors include: the cognitive level of the assessment; teachers' general educative values; and teachers' perceptions to the use of classroom assessment practices. Furthermore,

teachers' educative values and beliefs are known to significantly affect their practice in the classroom (Pyle & Deluca, 2013; Zacharos, Koliopoulos, Dokimaki, & Kassoumi, 2007). Dobrow, Smith and Poner (2011) argued that teachers' values, attitudes, and beliefs can also have a direct impact on the quality of feedback provided to students in the classroom. The researchers also contended that grading can have negative as well as positive consequences to the overall success of the learner. Consequently, providing students with feedback on the quality of their work and on the progress of their learning constitutes an important part of the grading process.

Feedback

Providing students with quality feedback about their learning is important as it provides the opportunity for students to improve the quality of their work. Furthermore, providing feedback also promotes the desired learning outcomes and provides necessary guidance for achieving the required standards (Kubiszyn & Borich, 2013). Consequently, providing good feedback will provide students with the opportunity to improve the quality and product of their learning (Pyle & Deluca, 2013; Zacharos, Koliopoulos, Dokimaki, & Kassoumi, 2007).

Unfortunately, some educators are not adequately equipped with the requisite knowledge and skills needed to provide the quality feedback required in order for learners to achieve the desired learning outcomes. In these circumstances, such educators will find it extremely difficult to provide the quality feedback and guidance that learners will need in order to improve the quality and product of their learning (McMillan, Myran, & Workman, 2002). According to Hanson and Carpenter (2011), effective feedback is important for students' success. Consequently, effective feedback should be prompt, clear, relevant, and provide precise information as to what went well and what the learner is expected to do in order to further improve the quality of their work (Kubiszyn & Borich, 2013).

Brookhart (1993) contends that some teachers are more traditional in their approach to teaching and classroom assessment practices and are generally more uncomfortable with the grading policies and procedures outlined by school systems. As a result, these teachers will tend to deviate from the recommended approaches to assessment and grading. Consequently, these teachers are more prepared to adapt a more traditional approach to grading over the contemporary approach to teaching and classroom assessment practices. Furthermore, these conflicting perceptions of classroom assessment will ultimately affect the quality of teaching and the level of learning and progress attained by learners in the classroom.

Standardized Assessments

Standardized testing or high stakes testing is generally designed to provide information about students' academic ability. This norm-referenced or criterion-referenced test is often used to make inferences about the ability of individuals within the population. These standardized assessments are usually designed by commercial test developers who often provide guidance on the administration, scoring, and interpretation of test results (McMillan, Myran, & Workman, 2002). In addition, these standardized assessment materials serve as a tool for measuring academic outcomes and for providing a set of academic standards for individuals being examined. Furthermore, these widely accepted pieces of assessment materials are used to measure students' academic progress and to warrant accountability across the education systems. Consequently, standardized assessment is used for ensuring that academic standards are attained by schools, teachers, and students alike (Croft, Roberts, & Stenhouse, 2016).

Standardized assessment has received increased attention from the education community in recent years. Since the inception of the No Child Left Behind Act, school systems have been given the mandate to provide results on students' attainment and progress in the classrooms.

Consequently, there have been serious concerns regarding the effectiveness of standardized testing. Contrasting views on standardized assessments suggest that standardized testing yields more negative effects on students' outcomes and teachers' progress than any other approaches to classroom assessment (Minarechová, 2012). A recent study that was conducted by Arizona State University suggests that high stakes testing has negative consequences on the quality of education and the level of progress achieved by students. The study revealed that nineteen out of the twenty-eight states surveyed revealed that they had experienced a significant decrease in the attainment of fourth grade mathematics scores on the National Assessment of Educational progress (NAEP). The study further revealed that when compared to national averages students' dropout rates increased and graduation rates decline (Negative effects of high-stakes testing, 2003).

Many countries around the world use standardized or high stakes testing as a key component of classroom assessment in the education system; England is a key player among these countries. These examinations are crucial as they are used to determine secondary schools and university places within the education system. These standardized tests are important in measuring the level of skills, progress, and competencies in many subject areas. Consequently, these standardized assessments are used as part of classroom testing and measurements in many schools. Teachers play a major role in the preparation, administration, and delivery of subject content knowledge that necessitates the required standards on these assessment (Abrams, Pedulla, & Madaus, 2003). For this reason, Office of Standards in Education (2014) maintains that classroom assessment plays an important role in evaluating the level of skills, knowledge, and competencies achieved by learners in the classroom. Furthermore, classroom assessment also provides assessment data to educators about the quality of teaching and the level of progress

achieved by all learners in the classroom (Campbell and Evans, 2010).

Even though there is a general perception that standardized testing is mainly used to inform educators and policy makers about teaching standards, standardized testing can provide evaluative as well as diagnostic information about learning (Pyle & Deluca, 2013; Zacharos, Koliopoulos, Dokimaki, & Kassoumi, 2007). By examining the purpose of an assessment and providing the most appropriate tools for the assessment, educators will be better able to make educative decisions about the quality of teaching and the level of progress achieved by learners in the classroom (Rowtree, 1987).

The Philosophy of Classroom Assessment Practices

The philosophy of classroom assessment practices began before the publication of the Hadow report in 1923 and has changed drastically over the years with changes in legislature, government policies, and the reform of secondary education in Britain. The Education Act of 1944 introduced a tripartite secondary education system and made secondary education free for all secondary age children in Britain. Assessment in schools was based mainly on the end of year government examinations, known as the 11 plus examinations. Students were allocated to schools based on their ability, which was solely dependent on their performance on these end of year examinations (Hyland, 1998; King, 1989). In light of this type of classroom assessment practice, most students were taught in classrooms where there was limited use of classroom assessment strategies used to assess the learning and progress of students (Hyland, 1998). This view of classroom assessment in mathematics sits with the absolutist philosophy on classroom assessment practices (Ernest, 1991).

For more than a decade researchers in the field of education have investigated the impact of teaching style on students' achievement in mathematics (Elkatms, 2012). Results from these

studies suggested that a close relationship exists between teachers' philosophy of mathematics and their teaching and assessment style (Jane, 2013). The argument is that teachers who hold absolutist perceptions on teaching will teach mathematics and assess students' knowledge from an absolutist perspective (Alkharusi, Aldhafri, Alnabhani and Alkalbani, 2014). As a result, these mathematics teachers tend to teach mathematics as a set of rules, algorithms, and axioms that allows for little or no deviation from the prescriptive lessons. To the absolutist mathematicians, knowledge is incorrigible; therefore responses to mathematical questions can either be wrong or right (Allen, Gregory, Mikami, Lun, Hamre, & Pianta, 2013).

To the absolutist, classroom assessment is normally characterized by tests, quizzes, or other paper-based exercises at the end of a topic to assess students' learning (Ernest, 1991). From this perspective, it would appear that in the absolutist classrooms there are limited opportunities for teamwork and collaborative assessment. The absence of frequent and meaningful classroom assessment activities makes it difficult for the absolutist to ascertain the level at which students are progressing towards their benchmark or age-related targets (Chen, Crockett, Namikawa, Zilimu, & Lee, 2012).

In addition, there is limited use of classroom assessment strategies to monitor progress of learning. Consequently, teaching in the absolutist classrooms is often characterized by minimal student interaction and inadequate use of assessment for learning strategies in the design of learning (Antoniou & James, 2014). In the absolutist classrooms, the design of learning activities does not always allow students to acquire or develop skills at the appropriate level, which should be matched to their needs, prior attainment, or expectations of future achievement (Chen, Crockett, Namikawa, Zilimu, & Lee, 2012).

The contrasting fallibilist philosophy view teaching and learning as an active experience

where learning involves social interactions among people (Ernest, 1991). In the fallibilist classrooms there are opportunities for independent learning and frequent use of classroom assessment strategies used for monitoring the levels of progress made by students (Chen, Crockett, Namikawa, Zilimu, & Lee, 2012). Consequently, teaching in the fallibilist classrooms features a variety of instructional methods that depend on the subject matter and the learning needs of students.

Teaching activities in the fallibilist classrooms are often characterized by student centered learning, group work, individual activities and one to one activities with teachers (Ernest, 1991). Despite this varied approach to teaching and learning, frequent use of classroom assessment strategies is evidently used in the fallibilist classroom. Teachers who embrace the fallibilist approach to classroom assessment will appreciate multiple assessment techniques used to evaluate the acquisition of knowledge and skills (Andrews, & Hatch, 1999).

The assessment for learning strategies used in the fallibilist classrooms tends to provide frequent feedback about the quality of learning which will promote deeper understanding of knowledge, concepts, and skills rather than assigning numeric scores and letter grades to tasks. In addition, the fallibilist philosophy recognizes the need for different approaches to teaching, learning, and classroom assessment, thereby promoting multiple assessment techniques when assessing students' work. These techniques are used to triangulate the evidence provided about students' progress and arriving at an accurate judgment about learning (Zacharos, Koliopoulos, Dokimaki, & Kassoumi, 2007). Furthermore, these techniques support the modern approach to teaching and learning which promotes the use of contemporary teaching styles and classroom assessment strategies.

According to a recent report published by the Office for Standards in Education (2014),

students' performance in schools is based on the experiences provided by their classroom

teachers. Therefore, teachers have a significant role to play in the quality of education received

by each learner in the classroom. Thus, students' progress in the classroom, confidence, and

attitude towards learning, understanding, and mastery of skills are all shaped by the types of

experiences they encounter in the classroom (Office for Standards in Education, 2014). Further

studies also proved that a direct relationship exists between teachers' attitudes and students'

learning. The argument is that teachers' attitudes have a direct impact on students' attitudes, and

students' attitudes in turn have a direct impact on learning (Stiggins, Conklin, & United, 1992).

Classroom Perceptions

The changes that occurred in the classroom as a result of the new legislative changes on

teachers' performance standards have elicited extensive debates on the subject of classroom

assessment practices from mathematics teachers. How classroom assessment practices are

perceived by mathematics teachers will ultimately determine the level of success. Bonner and

Chen (2009) hold the view that teachers are more willing to accept nonstandard ways of

classroom assessment practices rather than assessment practices based on teaching standards.

Muñoz, Scoskie, and French (2013) contend that there is a direct relationship between teachers'

perceptions of teaching and students' achievement in the classroom. Rubie-Davies, Peterson,

Irving, Widdowson, and Dixon (2010) hold the view that teachers' expectations and beliefs play

an important role in students' academic outcome. The argument is that teachers' beliefs are

influenced by personal academic experiences which are turn influenced by content knowledge and

skills (Gomez, Zwiep, & Benken, 2013).

Kunter et al. (2008) found that a strong positive relationship exists between teachers'

enthusiasm for the subject matter of mathematics and the teaching of mathematics. The

researchers found that teachers who are more excited about the teaching of mathematics usually have higher expectations about students' outcome in the subject. From this perspective it is evident that a strong relationship exists between teachers' perceptions, enthusiasm, and the use of classroom assessment strategies in mathematics (Kunter et al., 2008). Hodge, Gerberry, Moss, and Staples (2010) contend that the negative perceptions held by teachers can be challenged through preservice and in-service induction programs aimed at changing the values and attitudes to education.

Teachers' Perceptions on Classroom Assessment Practices

The Department for Education believes that classroom assessment practice is the number one solution to students learning, enthusiasm, and interest in the classroom (Department for Education, 2012). In spite of their high expectations, a large number of classroom teachers' perceive classroom assessment as the assignment of grades and testing (Pyle & Deluca, 2013; Zacharos, Koliopoulos, Dokimaki, & Kassoumi, 2007). There are many teachers who believe that children are empty vessels which need to be filled with required skills and knowledge. This assumption is precipitated by the pressure of ensuring that students performed well on state mandated standardized test (Dixon, 2011).

Many researchers such as Cheng, Rogers, and Hu (2004) contend that the focus of teachers should be on enhancing children's ability to think rationally and creatively rather than their ability to score correctly on state mandated standardized test. This, however, can only be achieved in situations where teachers are prepared to actively engaged students in constructive dialogue informed by sound classroom assessment strategies. However, in order for teachers to challenge students and actively engaged them with meaningful classroom assessment activities they must be able to accurately assess students' learning needs.

There is sufficient evidence to suggest that many teachers in schools refer to classroom assessment as grading of test and quizzes (Lambert & Lines, 2000; Campbell & Evans, 2000). This seems to be a common view held by many teachers, especially by teachers of mathematics and science education (Zacharos, Koliopoulos, Dokimaki, & Kassoumi, 2007). Many researchers, such as Calculator and Black (2009) contend that our values and beliefs are shaped by our sociological and cultural circumstances.

A prominent study was conducted by Jane (2013) who studied South African teachers' conceptions of classroom assessment practices. The study revealed that tests and quizzes were most frequently used as classroom assessment materials rather than any other forms of assessment materials used in classroom assessment. The study also revealed that teachers' knowledge, values, and beliefs also played a significant role in the type of items chosen for tests and quizzes. In addition, Jane (2013) found that most teachers perceive the use of assessment for learning strategies as an onerous task and added responsibility to their teaching assignment.

This has serious implications for the way some teachers' perceived practice classroom assessment and how assessment is carried out in the classroom. For this reason, it is believed that teachers' perceived practice on classroom assessment strategies are deeply rooted in their cultural, religious, sociological, and political perspectives on education (Lambert & Lines, 2000). This feature is evident in the way classroom assessment practices are carried out by most practitioners in the classroom. Igbalajobi (1983) evaluated the educational and training needs of elementary school teachers and found that training is needed for teachers in the area of classroom assessment practices. Such training will assist teachers in evaluating the skills that are needed in order to help students achieve their stated targets. Emberger (2007) contends that preservice teacher education programs pay very little attention to teachers' classroom assessment practices, thereby leaving

many teachers to conduct classroom assessment in the same way they were assessed while in school. This perpetual practice needs to be challenged with a change in perceptions and practices towards classroom assessment. This view supports the point that teachers' assessment practices are closely linked to their values, beliefs, social, cultural, and environmental influences which have a direct impact on practice (Campbell & Evans, 2010).

Perceptions of Teachers' Preparation Programs

A study was conducted by Campbell and Evans (2000) to investigate preservice teachers' classroom assessment practices. The study consisted of 27 preservice teachers who were enrolled in a preservice teacher preparatory science program. Findings from the studies revealed that teachers' choices of classroom assessment practices were influenced by their values, beliefs, and attitudes towards classroom assessment practices.

In addition, the study found that preservice teachers were inadequately prepared to effectively employ a variety of classroom assessment strategies to monitor students' progress in the classroom. This suggests that newly trained teachers will find it difficult to adequately address students' learning needs in the classroom. The study further revealed that the preferred classroom assessment choices were tests and quizzes. The results also suggested that pre-service teacher's values, beliefs, and attitudes have a direct influence on their classroom practices. Campbell and Evans (2000) recommended that specific training is needed in the areas of classroom assessment practices.

These changes are needed to address the negative perceptions to classroom assessment practices that are held by both pre-service and practicing teachers at all levels of the teaching profession. A recent article published by Bond (2011) suggest that teachers' perceptions of classroom assessment is influenced by the quality of preparation received during training. The

article further stated that teachers who have received high quality preservice training tend to have high expectations for students' performance in the classroom. These teachers tend to own students' progress and will use classroom assessment strategies more readily than others. In addition, these teachers will employ a number of assessment techniques used to monitor the level of progress within the classroom (Bond, 2011).

Perceptions of Mathematics Teachers from Rural and Urban Schools

Researchers have found that mathematics and science teachers employed in rural secondary schools have very different perceptions and practices to the use of classroom assessment practices in lessons (Panizzon & Pegg, 2008). The research found that when compared to teachers in urban secondary schools, teachers from rural secondary schools often find themselves doing most of the concept and content instructions, whereas teachers in urban schools tend to provide support that is in keeping with the general expectations of teachers as a facilitator of learning (Aaron & Herbst, 2015). Consequently, these instructional responsibilities are assumed by educators who are more confident in their classroom and are more willing to collaborate on planning and instructional responsibilities (Panizzon & Pegg, 2008). Yin, Olson, Olson, Solvin, and Brandon, (2014) found that mathematics teachers are more successful in the classroom where they are willing to adapt a more creative and flexible approach to teaching and learning. These changes in teachers 'perceptions have resulted in many studies relating to teachers' perceptions and their role regarding the use of classroom assessment strategies in the classroom. The one size fits all approach to teaching and learning is the opposite of good classroom assessment practices within teaching (Frey, & Schmitt, 2010). Effective teaching and learning emphasizes the need to provide a creative approach to ensure that good teaching is evident through content delivery and effective classroom assessment practices (Yin, Olson, Olson,

Solvin, & Brandon, 2014). The negative perceptions of some mathematics and science teachers in rural schools could hamper the progress in achieving a consistent approach to teaching and learning in some schools (Panizzon & Pegg, 2008).

Perceptions of Teacher Efficacy with Classroom Assessment

Teacher efficacy may be defined as one's belief in their own ability to achieve a given task or a desired outcome (Isbell & Szabo, 2015). Teachers' values, beliefs, and attitudes about their own teaching or their efficacy with regards to their teaching abilities are strong indicators of their instructional performances in the classroom (Allen, et al., 2013). Gür, Cakiroglu, and Aydin (2012) stated that teachers' satisfaction with their performance plays an important role and contributed significantly to the overall quality of teaching, choice of instructional activities, and efficacy of classroom management. Consequently, teachers' attitudes toward instructional strategies and classroom management are known to have a direct impact on the quality of learning and progress made by students in the classroom (Isbell & Szabo, 2015). Furthermore, teachers' self-efficacy also affects their performance in the classroom as well as affect students overall progress in school (Allen, et al., 2013).

Allen, et al (2013) establish that teachers with higher levels of self-efficacy and motivation are more willing to employ new instructional strategies and are more willing to engage students in active learning. This view is well supported by Moseley, Bilica, Wandless, and Gdovin (2014), who established that a strong relationship exists between teaching efficacy and the social and cultural context in which the practice is observed. Furthermore, the researchers asserted that a direct link exists between teacher efficacy and cultural efficacy. The argument is that cultural efficacy has a direct impact on teachers' overall performance in the classroom. Similarly, teachers' performance has a direct impact on students' learning and progress in the classroom

(Allen, et al., 2013).

Students' Perceptions

Walker (2012) conducted a study to assess students' perceptions to classroom assessment strategies. The study found that most students perceive classroom assessment as test and quizzes administered at the end of a unit to assess their learning. The study found that developing students' beliefs and expectations about classroom assessment should begin with an institutional approach that provides regular feedback to monitor progress. Most of the students surveyed revealed that direct feedback from teachers without a percentage score would be meaningless in determining the levels of progress made within the classroom. Of interest also is the study conducted by Akos, Cockman, and Strickland (2007) to examine the effect of classroom assessment practices in a diverse educational setting in the United States. The results of the study revealed that classroom assessment strategies are essential in meeting the diverse needs of learners in special education units. The argument is that specific intervention strategies are needed to address the growing needs expressed by different subgroups within the population. These interventions should be targeted to individuals rather than to the entire group (Filer, 2000). Findings from these studies do not provide positive perceptions of classroom assessment strategies in the classroom.

Moen, Davies, and Dykstra (2010) studied the perceptions held by a number of doctoral students towards the professors' management practices. The results found that students' perceptions of teachers are usually formed by a combination of factors. The students noted the following as important factors: classroom management style, conduct during and outside lessons, frequent feedback, and content knowledge. Research found that students' perceptions of teachers' management practice can have a direct relationship on students' progress.

Adnan and Zakaria (2010) conducted a study to explore the expectations and belief of preservice mathematics teachers. Results from the study found that a direct relationship exists between teachers' expectations and students' outcome. It was evident from the research that where teachers have high expectations students generally perform better than in situations where teachers have lower expectations for students. This type of relationship can significantly affect teaching standards, thereby required immediate attention to change the perceptions and practices of some educators (Campbell & Evans, 2010).

A number of studies were conducted to examine the effect of classroom assessment practices on students' achievement in the classroom. Results from these studies have shown that teachers' assessment practices have a direct impact on students' learning. A prominent study was conducted by Perrone (2011) to investigate the effect of classroom-based assessment and language processing on the second language acquisition of EFL students. The study consisted of 35 kindergarten students who were examined during instructions. The results revealed that where classroom assessment strategies are effectively used students' learning and mastery of the content were examined to be significantly higher than in classrooms where assessment practice were missing (Perrone, 2011). Results from this study suggest that regardless of the age and ability ranges of students, classroom assessment practices will have a direct impact on students' outcome in the classroom. Further evidence suggests that effective classroom assessment strategies are the key ingredients to the overall effectiveness of lesson planning and content delivery (Department for Education, 2012).

Researchers, such as Akos, Cockman, and Strickland (2007) suggest that a close relationship exists between teachers' performance in the classroom and students' attainment in mathematics. The argument is that teacher's performance will influence students' learning, and

learning will impact progress (Chen, Crockett, Namikawa, Zilimu, & Lee, 2012). The low achievement rate resulting from the lack of effective classroom assessment strategies is a clear indication that training is required in order to change the perceptions and practices of some mathematics teachers at the secondary school level. A change in perceptions could improve the quality of classroom assessment practices. Chen, Crockett, Namikawa, Zilimu, and Lee (2012) have suggested that effectively classroom assessment strategies will also improve students' outcome and improve their life chances beyond secondary education.

Parents Perception to Classroom Assessment Practice

Allen and Fraser (2007) conducted a study investigating science learning among elementary students and their parents in Florida. A survey was administered to both parents and students. The study found that both students and parents preferred a more positive learning environment where teaching is more interactive and engaging than a less favorable learning environment. The researchers further stated that, although students tend to prefer more investigative learning tasks, parents on the other hand tend to prefer a more structured classroom based on engaging teaching and learning activities (Allen & Fraser, 2007). Findings from these studies suggest that parents' beliefs on education have a direct influence on the quality of education they expect for their offspring (Boyce, 2011). Consequently, parents with high values and beliefs tend to challenge and demand a higher standard of education for their offspring than parents with lower values and beliefs about education (Allen & Fraser, 2007).

Bong (2008) researched the effects of parent-child relationships and classroom goal structures on motivation, help-seeking avoidance, and cheating. The study found that where a strong parent-child relationship exists the effect on the measured outcome tends to be more positive. The results showed that a large number of parents perceived classroom assessment as a

piece of structured classroom activity designed to measure the outcome of students' learning. Consequently, these parents view classroom assessment as a means of assigning grades for students' effort on test exercises (Bong, 2008).

School Leaders Perception to Classroom Assessment Practice

School leaders' perceptions play a significant role in leadership of the school. The values, attitudes, and beliefs held by school leaders play a crucial role in the success of the institution. Research in the area of classroom assessment practices suggest that school leaders' perceptions of classroom assessment have a direct impact on the management of teaching and learning within schools (Wu, Lai, Shih, & Liao, 2015). Range, Duncan, Scherz, and Haines (2012) found that school culture is influenced by the perceptions of school leaders. The researchers conducted a study to examine school leaders' perceptions about incompetent teachers. The study found that teachers' classroom management practices play an important role in the overall performance in the classroom. The argument is that teachers' performance is determined by their classroom management practices which in turn influences the quality of teaching and learning in the classroom.

Allen, Ort, and Schmidt (2009) conducted research examining how a small urban high school used assessment across the curriculum. The researchers found that classroom assessment practices are more effective when they are connected to the school's staff development program. Consequently, developing classroom assessment practices through coaching and mentoring as part of a school induction program will promote a consistent approach to planning and content delivery. The researchers argued that if new teachers are going to be successful at classroom assessment then adequate training and induction is needed to support the reflective approach to planning and teaching. For this reason, a strong leadership approach to classroom assessment

practices is needed in all schools (Office of Standards in Education, 2014).

Use of Assessment Data

Assessment data is widely used and is accepted as a common tool used for making decisions about students' learning in the classroom. Many educators as well as school support professionals have the responsibility to collect assessment data through a number of data collection methods provided by the school systems. Even though these professionals are given the responsibility to collect and interpret assessment data used in the classrooms, there are many educators who find it difficult to perform the task as they are not adequately trained in using assessment data in the classrooms (Department of Education, 2012). Rowtree (1987) argued that in order to effectively understand and communicate assessment information, teachers should be adequately trained in the use of classroom assessment strategies. Consequently, teachers will be well prepared to meet the learning needs of their students as they will be better able to plan and deliver the curriculum from a more informed position (Office of Standards in Education, 2014).

The importance of classroom assessment data cannot be overemphasized in the field of education. Government officials, school administrators, and teachers all use assessment data to make important decisions about students' learning. Assessment data provides information about the quality of teaching and learning in all areas of the curriculum. Teachers require assessment data to diagnose students' learning needs, design and plan intervention programs, and develop strategies to address the gaps in students' learning. Consequently, assessment data provides evidence about the level of progress made by students in relation to their starting point and their trajectory flight path (Department of Education, 2012). Furthermore, assessment data can provide the type of evidence needed in relation to the quality of teaching and the level of progress made in the classrooms (Department of Education, 2012).

Assessment data is important in the planning and delivery of content instructions. Therefore, educators should use assessment data to make informed decisions about the quality of teaching and the level of progress attained by learners. Moreover, it is expected that teachers should have a basic understanding of how assessment data is used and how it affects students' learning (McMillan, Myran, & Workman, 2002). Furthermore, assessment data is essential as it provides information which can help teachers to plan their classroom assessment strategies in the classroom. In addition, assessment data can help teachers to evaluate their own teaching by providing information on students' progress towards the stated objectives. Consequently, teachers will be able to modify their teaching to reflect the learning needs of the learners. In general, assessment data provides a range of information which will enable teachers to interpret information about students' learning and plan the necessary interventions to assist students in achieving the learning goals (Lambert & Lines, 2000; Campbell & Evans, 2000).

It is apparent that teachers should be trained in using data arrived from classroom assessment and evaluations. Some professional organizations, such as The Association of Teachers and Lecturers (ATL), National Association of School Union of Women Teachers (NASWUT) and Association of School Leaders (ASCL) have devised workshops and training seminars that could help teachers in becoming competent with the use of assessment data in the classroom. Through consultation with the General Teaching Council of England (GTCE), these professional organizations have recommended that teachers be trained in the use of assessment data and classroom assessment strategies. Furthermore, these organizations have encouraged

teachers to use assessment data in the planning and delivery of lessons (Department of
Education, 2012).

Assessment in Mathematics

Assessment practices in mathematics remains a challenge throughout the primary and
secondary school systems in Britain. The majority of mathematics teachers in the secondary
schools are fully qualified professionals who have acquired qualified teacher status (QTS)
(Office for Standards in Education, 2014). The majority of the secondary school training places
are funded by the government with a large number of mathematics teachers receiving a bonus
payment upon entering the profession as a mathematics teacher (Office for Standards in
Education, 2014).

Despite the government's attempt to attract the brightest to the profession, these teachers
are known to lack the experience as mathematics teachers. They also lack the relevant
experience with classroom assessment practices as they have never previously taught or received
training in the field (Campbell & Evans, 2010). This lack of experience, knowledge, and skills
poses a problem to the system as these teachers are not adequately prepared to meet the diverse
learning needs of students in the classroom (Akos, Cockman, & Strickland, 2007). Although
these teachers have undergone short term placements in secondary schools as part of their
training, they are not adequately prepared to meet the learning needs of the diverse student
population. This type of recruitment arrangement is one of the major contributing factors to poor
standards in classroom assessment practices in Britain (Department of Education, 2012).

Teachers' effectiveness remains an important factor in measuring the overall
effectiveness of the curriculum. A school may have a number of additional resources, but if the
quality of teaching and learning is not effectively managed then the overall provision will be

deemed inadequate. The overall effectiveness of the mathematics curriculum remains a national challenge with all assessment indicators proving that performance in mathematics is trending downwards (Office for Standards in Education, 2014). This low achievement and lack of engagement in mathematics is a clear indication that changes are needed in order to assess the way in which mathematics is taught and assessed in schools.

The reform in secondary education has triggered the implementation of a new mathematics curriculum in 2010. In the same year the Department for Education had implemented the new key stage three national curriculum standards. In the same year secondary school enrollment increased from 1.7 million to 2.3 million students (Department of Education, 2012). This exponential increase in students' enrollment triggered extreme pressure on the secondary education system. In an attempt to address the problem many schools had to appoint agency supply and agency teachers to fill the vacancies in mathematics. This shortage in mathematics teachers, coupled with a large number of newly qualified mathematics teachers could contribute to the problem and could be part of the reason for the low attainment rate in mathematics at the secondary school level.

Analysis of the General Certificate in Secondary Education (GCSE) results at the national level proved that the performance of girls is significantly lower than that of boys in the areas of mathematics and science at the secondary school level (Office for Standards in Education, 2014). Further analysis also suggests that in general, students in the urban areas perform at a significantly higher level than their counterparts in the rural areas of England (Office for Standards in Education, 2014). Despite the low levels of achievement among girls, the analysis of the results further proved that girls who reside in the urban areas of England perform significantly better than girls who reside in the rural areas of England (Department for

Education, 2012). This low level of achievement across the board among students in the rural areas suggests the need to further explore the perceptions of teachers working in different geographic settings in England.

Summary

The chapter has reviewed a number of factors that influence teachers' perceptions and practices of classroom assessment in mathematics. The chapter provides an overview of the theoretical framework that underpins the study. A review of the philosophy of classroom assessment was also undertaken in this chapter. In addition, the chapter also reviewed the beliefs about how teachers teach mathematics, and how teachers' classroom assessment practices can affect students learning and progress in the mathematics classrooms.

The chapter ended with a discussion on the current trends in students' achievements at the secondary level in England. In general, the literature suggested that teachers' values and beliefs about teaching, learning, and progress are influenced by their values, belief, social, cultural, political, and other environmental influences. From this perspective, it might be worth considering the effect of these socio-cultural, political, and environmental factors on the quality of classroom assessment practices in the classrooms in different geographical settings in England.

CHAPTER 3: METHODOLOGY

Overview of the Study

The purpose of this causal-comparative study was to compare the mean scores on the measures to determine if there were differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. The independent variable of interest for the study was defined as urban/rural classification (urban and rural secondary school mathematics teachers) in England. The dependent variable of interest for the study was defined as perceived frequency of usage and perceived skill in usage of classroom assessment practices in mathematics as measured by the Assessment Practices Inventory (API).

Research Design

The causal- comparative research design was identified as the most appropriate research design for this quantitative study. As no treatment was administered to the subjects by the researcher, the nonexperimental research design was inherently necessary. This causal-comparative research design is the most suitable for examining the differences between two groups by comparing the pre-existing differences in the independent variable to measure the outcome on the dependent variable (Gall & Borg, 2006). In this study, two groups were formed on the basis of the independent variable (urban and rural secondary school mathematics teachers) and then compared on the dependent variable (perceived frequency of usage and perceived skill in usage of classroom assessment practices in mathematics). The researcher did not manipulate any variables in the study. Furthermore, this causal-comparative research design was most suitable because of the possible cause-and effect relationship between the independent variable (urban and rural secondary school mathematics teachers) and the dependent variable (perceived

frequency of usage and perceived skill in usage of classroom assessment practices in mathematics in this study.

Research Questions

The following research questions and associated null hypotheses were used to guide the study:

RQ1: Is there a difference in perceived frequency of usage of classroom assessment in mathematics (as measured by the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England?

RQ2: Is there a difference in perceived skill in usage of classroom assessment practices in mathematics (as measured by the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England?

Hypotheses

$H_0$1a: There is no statistically significant difference in perceived frequency of usage of classroom assessment in mathematics (as measured by the overall results of the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England.

$H_0$1b: There is no statistically significant difference in perceived frequency of usage of classroom assessment in mathematics (as measured by the mean scores from the categories of the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England.

$H_0$2a: There is no statistically significant difference in perceived skill in usage of classroom assessment practices in mathematics (as measured by the overall results of the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers

in urban schools in England.

H$_0$2b: There is no statistically significant difference in perceived skill in usage of classroom assessment practices in mathematics (as measured by the mean scores from the categories of the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England.

Sampling Procedures

Nature of the Population

Gall et al (2006) claimed that the target population and the accessible populations are extremely important to the outcome of the results in a quantitative study. In this study, the target population consisted of all mathematics teachers working in rural and urban secondary schools across England. The accessible population in this study consisted of mathematics teachers randomly chosen from the target population of mathematics teachers in England. The accessible population was given the choice to participate in the study. The accessible population for this study consisted of 300 urban secondary school mathematics teachers and 300 rural secondary school mathematics teachers.

Sampling Technique

The sampling frame consisted of a list of all secondary schools in England. These schools comprised approximately 9000 fully qualified mathematics teachers from rural and urban secondary schools in England. Schools were randomly selected from the sampling frame of all secondary schools in England. Schools were divided into two categories: urban secondary schools and rural secondary schools. The researcher assigned a number to all schools. A random number generator was used to select schools from the population of schools. Mathematics teachers from the randomly selected schools were identified from the school

published staffing list. These identified mathematics teachers were divided into two groups: urban secondary school mathematics teachers and rural secondary school mathematics teachers. These teachers were assigned a number, and a number generator was used to select teachers from the population of urban and rural secondary school mathematics teachers. Information on the details of the study as well as the API was sent electronically to each of a group of 100 randomly selected urban mathematics teachers and 100 randomly selected rural mathematics teachers of the target population. This became the accessible population. Participants of the study were those in the accessible population who choose to complete the online survey. The sample was drawn from a population with a moderate effect size of mathematics teachers. Gall and Borg (2006) contend that for a moderate effect size with a statistical power of 0.7, and an alpha level of 0.05, at least 100 participants are required in the sample (Gall & Borg, 2006, p. 145). Consequently, the study required a minimum of 50 urban and 50 rural secondary school mathematics teachers. At the end of the first week of the survey, less than 50 urban and 50 rural mathematics teachers of the accessible population participate, therefore another group of 100 randomly selected urban mathematics teachers and 100 randomly selected rural mathematics teachers were randomly chosen from the target population and sent the email at the beginning of week 2. This procedure was repeated at the beginning of week 3 and the survey continued to the end of week 3 where at that point, the minimum was met and marginally exceeded.

Participants

The study comprised 109 participants from the accessible population who chose to complete the online survey. Participation in this study was voluntary with no incentives and compensation given (Appendix A). The sample consisted of 53 mathematics teachers from 23 urban secondary schools and 56 mathematics teachers from 21 rural secondary schools drawn

from a population of secondary school mathematics teachers in England. The total number of participants in the sample were selected from 12 urban Local Education Authority (LEA) and 11 rural Local Education Authority across England. The participants in the sample have attained a minimum of two years teaching experience and are recognized as fully qualified mathematics teachers by the General Teaching Council of England (GTCE). The years of experience for the participants in the sample ranged from 3 to 33 years. The mean length of service for urban participants is 10.98 years and 9.98 years for rural participants. The sample comprised 59 (54.1%) male participants and 50 (45.9%) female participants. The ethnic composition of the sample consisted of 22 (20.2%) Caucasian, 18 (16.5%) Asian, 44 (40.4%) Black or British Black, 17 (15.6%) mixed, and 8 (7.3%) from other ethnic backgrounds. Of the 109 participants in the sample, 66 (60.6%) have a Bachelor's degree, 27(24.8%) have a Master's degree, 14 (12.8%) have a Doctorate degree and 2 (1.8%) have other qualifications not mentioned in the above categories. The age of the participants in the sample ranged from 20 to 70 years in age with a mean age of 40.31 years. The API was used to gather data from the participants in the study. An information pack along with the API was sent electronically to each participant's school email system.

Settings

Data from the 2011 national census published by the Office of National Statistics (ONS) in England revealed that there are approximately 75 rural school districts and 83 urban school districts across England (Census, 2011). Of this total number of school districts, there are around 4000 maintained secondary schools across England. Meanwhile, there are approximately 90,000 teachers and around 2,600,000 students in the secondary school system in England. Of the 10,000 mathematics teachers in the secondary school system in England, approximately 90% are

fully qualified mathematics teachers. Of this number, approximately 5,800 (58%) are

males and 4,200 (42%) are females. There are around 2,000 (20%) Caucasian, 1,900 (19%)

Asian or Asian British, 5400 (54%) Black or British Black, 500 (5%) mixed, and 200 (2%) are

from other ethnic backgrounds in the settings. The age ranges from 20 to 70 years in age. In

terms of qualification, approximately, 6,300 (63%) are holders of Bachelor's degree, 2,900

(29%) are holders of Master's degree, and 800 (8%) are holders of Doctorate degree in

mathematics or a related field in education.

Instrumentation

The instrument that was used to measure the differences in perceptions of classroom

assessment practices between mathematics teachers in urban secondary schools and mathematics

teachers in rural secondary schools in England is the Assessment Practices Inventory (API). The

API is used by researchers for assessing concerns regarding classroom assessment practices

(Zhang & Burry–Stock, 1994). The API consist of 67 questions. Each of the 67 questions on the

survey consists of a two-part survey item on a 5-point Likert scale. The first part measured

perceived frequency of usage of classroom assessment in relation to the survey question. The

scale ranged from 1 (not at all used), to 5 (used very often). Whereas, the second part measured

the perceived skill in usage of classroom assessment practices in relation to the survey question.

The scaled ranged from 1 (not at all skilled) to 5 (very skilled). The scores on each subscale

ranged from 67 to 335 in points. A score of 67 points on the first subscale suggested that the

participants have scored themselves with the lowest perceived frequency of usage for each

question on the survey. Meanwhile, a score of 335 points on the first subscale suggested that the

participants have scored themselves with the highest perceived frequency of usage for each

question on the survey. Similarly, a score of 67 points on the second subscale suggested that the

participants have scored themselves with the lowest perceived skill in usage for each question on the survey. Meanwhile, a score of 335 points on the second subscale suggested that the participants have scored themselves with the highest perceived skill in usage for each question on the survey. The combined score on the API ranged from 134 to 670 points. A combined score of 134 points suggested that the participants have scored themselves with the lowest combined perceived frequency of usage and perceived skill in usage for each question on the survey. Whereas a combined score of 670 points suggested that the participants have scored themselves with the highest combined perceived frequency of usage and perceived skill in usage for each question on the survey.

The API was selected because it was designed to assess teachers' perceptions regarding classroom assessment practices (Zhang & Burry–Stock, 1994). The API was piloted in a similar study assessing pre-service teachers' classroom assessment skills (Zhang, 1995). Consequently, the results from the pilot study were used to advise the improved version of the API. Since the revised version of the API was created, this instrument was administered to a total of 205 participants as part of a study conducted in 2005 (Frazier, 2007). In addition, the API is considered a reliable and valid survey instrument (Wright & Stone, 1979; Zhang, 1995). The reliability of API was established by a Cronbach alpha of .97 and the item-to-total correlations were all above .37. The API standard error of measurement for the total score was confirmed at 7.7. The Rasch model and factor analyses was used to confirm the construct validity of the API. The API was sent electronically to the participants through the participating school's email system. On average, it should take a participant 15-20 minutes to complete the instrument. Permission to use the instrument in this study was obtained from the author of the API. See Appendix D for directions in administering the API and Appendix F where permission was

granted to use the instrument in this study.

Procedures

The researcher obtained approval to conduct the research from the Institutional Review Board (IRB) at Liberty University on February 22, 2016. Permission to use the instrument to collect data in this study was obtained from the author. In addition, consent to be included in the study was obtained from all participants. Information on the details of the study as well as the API was sent electronically to the accessible population. Instructions on how to complete the online survey was included in the communication that was sent to the schools' email of each member of the accessible population. As a means of safeguarding and to ensure that multiple completion of survey questionnaires was not allowed by a single user, each participant was issued a unique individual reference code. Each participant had received their unique individual reference code as part of the email that was sent with the information on the details of the study. The participants were expected to input their unique individual reference code in the appropriate box on the online survey before it was submitted. The issues regarding confidentiality and security of the data were outlined in the information that was emailed to the participants. Likewise, the email to the participants also outlined that the survey was voluntary and by completing the survey was considered as consent for being included in the study.

During the data collection and data analysis period all reasonable care was employed to ensure that the confidentiality of the data was maintained. Pseudonyms and codes were used to identify schools and participants in the study. Identifiable and sensitive information linking to schools and participants were withheld to ensure that the integrity of the study was not compromised. In addition, all information regarding the study was placed on my personal computer which was password protected. An independent sample t–test was used to analyze the

data within this study.

Data Analysis

The IBM Statistical Package for the Social Sciences (IBM SPSS 21) software was used to analyze the data in this study. Responses from the API were analyzed by the independent sample *t*-test. The independent sample *t*- test is the most appropriate statistical method for comparing the mean scores of two groups on the survey items (Gall & Borg, 2006). In this study, the independent sample *t*-test was used for comparing the mean scores on the measures to determine if there were statistically significant differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England.

CHAPTER 4: FINDINGS

The primary purpose of this causal-comparative study was to compare the mean scores on the measures to determine if there were statistically significant differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. The results were compared on the two research questions. The two research questions addressed the mean differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England.

This chapter is organized into four main sections. The first section restates the research questions and the null hypothesis associated with each research question. This section also provides the descriptive statistics for the variables of interest. The second section consists of the results of the assumption testing. The third section describes the data analysis for the two research questions. The final section provides a detailed summary of the results of the study.

Research Questions

The following research questions and associated null hypotheses were used to guide the study:

RQ1: Is there a difference in perceived frequency of usage of classroom assessment in mathematics (as measured by the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England?

RQ2: Is there a difference in perceived skill in usage of classroom assessment practices in mathematics (as measured by the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England?

Hypotheses

H₀1a: There is no statistically significant difference in perceived frequency of usage of classroom assessment in mathematics (as measured by the overall results of the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England.

H₀1b: There is no statistically significant difference in perceived frequency of usage of classroom assessment in mathematics (as measured by the mean scores from the categories of the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England.

H₀2a: There is no statistically significant difference in perceived skill in usage of classroom assessment practices in mathematics (as measured by the overall results of the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England.

H₀2b: There is no statistically significant difference in perceived skill in usage of classroom assessment practices in mathematics (as measured by the mean scores from the categories of the Assessment Practices Inventory 8.0) between mathematics teachers in rural schools and mathematics teachers in urban schools in England.

Demographics

The sample in this study comprised a total of 53 mathematics teachers from 23 urban secondary schools and 56 mathematics teachers from 21 rural secondary schools in England. The baseline characteristics and demographics information depicting the level of qualification of the participants, the ethnic composition and the age composition of the participants in the sample is illustrated in Table 1.

Table 1. *Sample Baseline Characteristics and Demographics*

		Teaching Location			
		Urban		Rural	
Characteristics		n	%	n	%
Gender	Male	32	(60.4)	27	(48.2)
	Female	21	(39.6)	29	(51.8)
	Total	53	(100.0)	56	(100.0)
Age	20-29	14	(26.4)	10	(17.9)
	30-39	19	(35.8)	14	(25.0)
	40-49	8	(15.1)	17	(30.3)
	50-59	9	(17.0)	10	(17.9)
	60-70	3	(5.7)	5	(8.9)
	Total	53	(100.0)	56	(100.0)
Degree	Bachelors	34	(64.2)	32	(57.1)
	Masters	13	(24.5)	14	(25.0)
	Doctorate	6	(11.3)	8	(14.3)
	Other	0	(0.0)	2	(3.6)
	Total	53	(100.0)	56	(100.0)
Ethnic	Caucasian	9	(17.0)	13	(23.2)
	Asian	9	(17.0)	9	(16.1)
	Black	23	(43.4)	21	(37.5)
	Mixed	8	(15.1)	9	(16.1)
	Other	4	(7.5)	4	(7.1)
	Total	53	(100.0)	56	(100.0)

Descriptive Statistics

The researcher computed descriptive statistics on the dependent variable for this study. The researcher used the following labels during the data analysis of the dependent variable. The overall perceived frequency of usage of classroom assessment practices by mathematics teachers was labeled as FrqUSE. The overall perceived skill in usage of classroom assessment by mathematics teachers was labeled as SklUSE. These labels were used the statistical data analysis in SPSS 21. All participants in the study scored the two part, 67 items on the 5-point Likert scale. The Dependent Variable Descriptive Statistics for the perceived frequency of usage and perceived skill in usage of classroom assessment is summarized in Table 2.

Table 2. *Dependent Variable Descriptive Statistics*

Variable	Perceived frequency of usage Urban	Perceived frequency of usage Rural	Perceived frequency of usage Overall	Perceived skill in usage Urban	Perceived skill in usage Rural	Perceived skill in usage Overall
N	53	56	109	53	56	109
Range	265	196	265	268	206	268
Minimum	67	70	67	67	67	67
Maximum	332	266	332	335	273	335
Mean	193.02	157.84	174.95	179.54	146.19	162.41
Std. Error	9.99	7.78	6.49	10.40	8.15	6.73
Std. Deviation	72.78	58.25	67.75	75.76	60.96	70.26
Variance	5296.75	3393.30	4590.39	5740.02	3716.34	4936.73

Descriptive statistics were also performed on the scores in each categories of the two-part API. The perceived frequency of usage in developing and administering paper-pencil tests and choose tests was labeled as FrqDevPap. The perceived skill in usage of developing and administer paper-pencil tests and choose tests was labeled as SklDevPap. The perceived frequency of usage interpreting standardized test results, calculating test statistics, and using assessment results in decision making was labeled as FrqIntR. The perceived skill in usage of interpreting standardized test results, calculating test statistics, and using assessment results in decision making was labeled as SklIntR. The perceived frequency of usage of performance assessment and informal assessment was labeled as FrqDevPerfA. The perceived skill in usage of developing performance assessment and informal assessment was labeled as SklDevPerfA. The perceived frequency of usage in communicating test results was labeled as FrqComTestR. The perceived skill in usage of communicating test results was labeled SklComTestR. The perceived frequency of usage of non-achievement based grading was labelled as FrqNonAchGd. The perceived skill in usage of non-achievement based grading was labeled SklNonAchGd. The perceived frequency of usage of ethics in assessment was labeled as FrqEthsAsmt. The perceived skill in usage of ethics in assessment was labeled as SklEthsAsmt. The perceived frequency of usage of grading was labeled as FrqGrad. The perceived skill in usage of grading was labeled as SklGrad. These labels were used for all statistical data analysis in SPSS 21. The descriptive statistics on the scores in each categories of API are summarized in Table 3.

Table 3. *Descriptive Statistics on Scores from the API Categories*

Variable	Perceived frequency of usage				Perceived skill in usage			
	Urban		Rural		Urban		Rural	
	M	SD	M	SD	M	SD	M	SD
Developing and Administering test.	50.38	14.36	48.46	9.85	40.42	17.28	35.18	14.89
Interpreting test results	31.41	11.09	27.79	10.85	33.04	14.62	27.57	14.12
Developing and using informal assessment	24.21	9.44	16.88	8.54	23.40	8.35	20.29	7.52
Communicating test results	16.89	8.26	11.89	7.02	17.54	5.90	15.63	4.57
Non-Achievement based grading	35.57	18.02	27.09	17.13	33.58	21.13	20.32	11.48
Ethics in Assessment	17.37	8.44	13.48	6.20	14.98	7.15	14.07	5.50
Grading	17.19	7.87	12.25	6.35	16.58	7.43	13.14	7.63

Data screening regarding checks for data inconsistencies, outliers, and preliminary normality were performed on all dependent variables. In checking for outliers, the standardized residuals (z scores) were used to test for outliers. Standardized residual scores outside the range of -/+3 were considered outliers (Warner, 2013, p. 153). From the visual examination of the z scores, no outliers were identified. Further examination of outliers was also conducted with the box and whisker plots. From the visual examination of the box and whisker plots, no outliers were identified in the data. This information is illustrated in Figures 1 and 2 for box and whisker plots.

Figure 1: Box and whisker plots for perceived frequency of usage of classroom assessments.
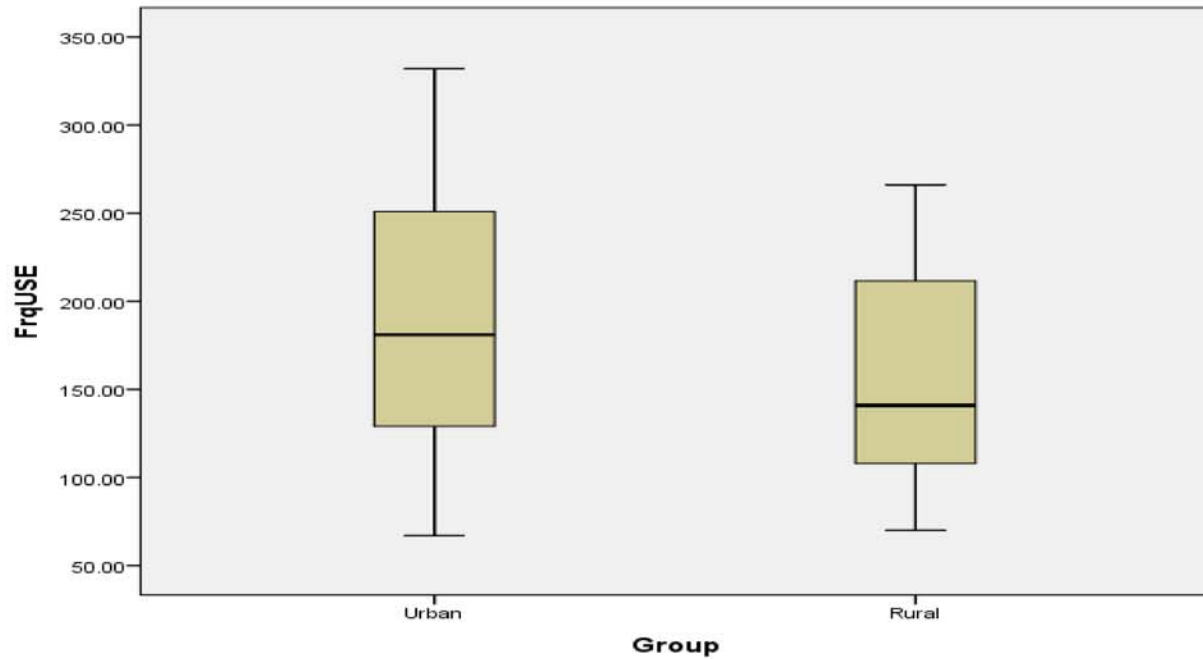
Figure 2: Box and whisker plots for perceived skill in usage of classroom assessment.
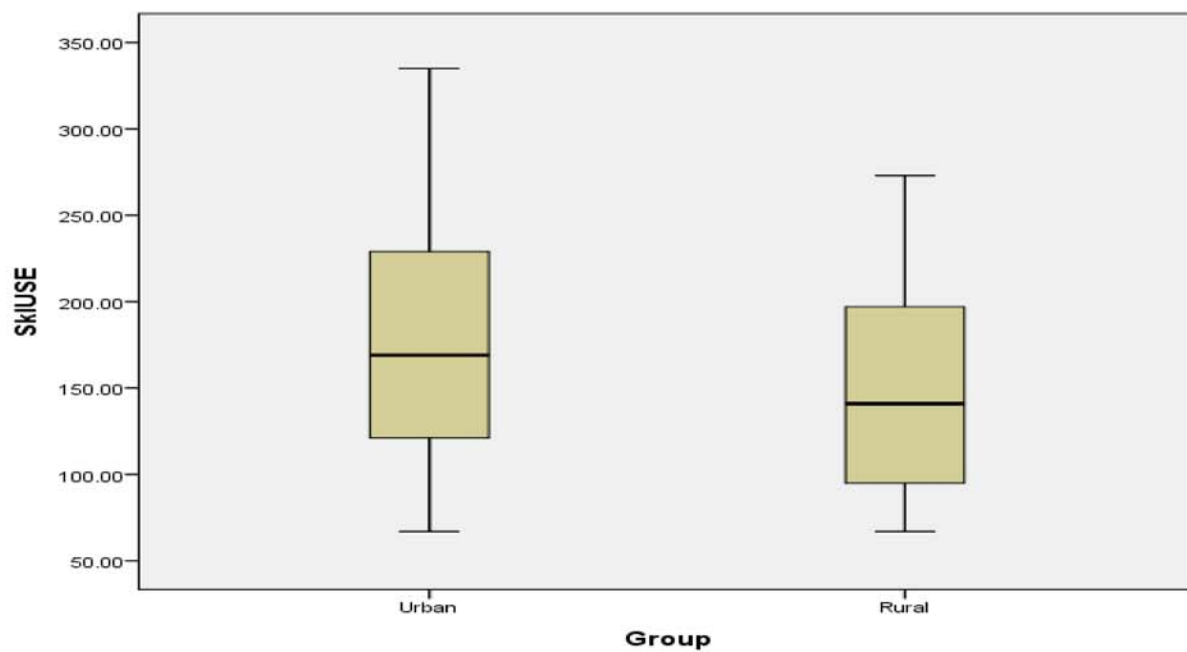
Assumption Testing

The independent sample t-test has three underlying assumptions (Green & Salkind, 2011).

The following are the three assumptions underlying the use of the Independent sample t- test. The

assumptions are as follows:

1. The cases represent a random sample from the population, and the scores on the test

    variable are independent of each other.

2. The test variable is normally distributed in each of the population as defined by the

    grouping variable.

3. The variances of the normally distributed test variable for the populations are equal.

Assumption 1

The scores on the test variables in the study are independent of each other as the

mathematics teachers in the study are either from rural secondary schools or urban secondary

schools in England. A teacher cannot be from both rural and urban schools at the same time.

Hence assumption 1 was met.

Assumption 2

Assumption testing for normality on the overall results was conducted using the

Kolmogorov-Smirnov results generated from the SPSS output. The Kolmogorov-Smirnov test is

the most appropriate test of normality for this study as the sample size was over 50. The

Kolmogorov-Smirnov results for all test variables on the overall results in the study were above

the .05 level, so normality was tenable. This information is presented in Table 4 for Kolmogorov-

Smirnov test.

Table 4. *Kolmogorov-Smirnov and Shapiro Wilk values for all Dependent Variables*

Group		Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Perceived	Urban	.097	53	.200	.959	53	.067
frequency of	Rural	.127	56	.025	.932	56	.004
usage							
Perceived	Urban	.090	53	.200	.945	53	.016
skill in usage	Rural	.097	56	.200	.933	56	.004

The Kolmogorov-Smirnov test for normality was also conducted on the scores obtained for each of the seven (7) categories from the API. The Kolmogorov-Smirnov results for all categories were above the .05 level. Normality was tenable for the scores from all categories of the API. This information is presented in Table 5.

Table 5. *Kolmogorov-Smirnov values on the API categories*

Categories	Perceived frequency of usage				Perceived skill in usage			
	Urban		Rural		Urban		Rural	
	Statistic	Sig.	Statistic	Sig.	Statistic	Sig.	Statistic	Sig.
Developing and Administer test.	.077	.200	.124	.033	.189	.000	.086	.200
Interpreting test results	.108	.177	.135	.013	.190	.000	.177	.000
Developing and using informal assessment	.137	.014	.158	.001	.088	.200	.162	.001
Communicating test results	.158	.002	.210	.000	.197	.000	.112	.077
Non-Achievement based grading	.123	.044	.204	.000	.172	.000	.241	.000
Ethics in Assessment	.149	.005	.106	.177	.106	.200	.158	.001
Grading	.140	.011	.123	.035	.088	.956	.129	.021

The assumption that the overall data was normally distributed was also determined by a visual examination of normality histograms. The normality histograms are displayed in Figures 3, 4, 5, and 6.

Figure 3: Normality histogram for perceived frequency of usage (FrqUSE) of classroom assessment for urban mathematics teachers, with normal curve displayed.
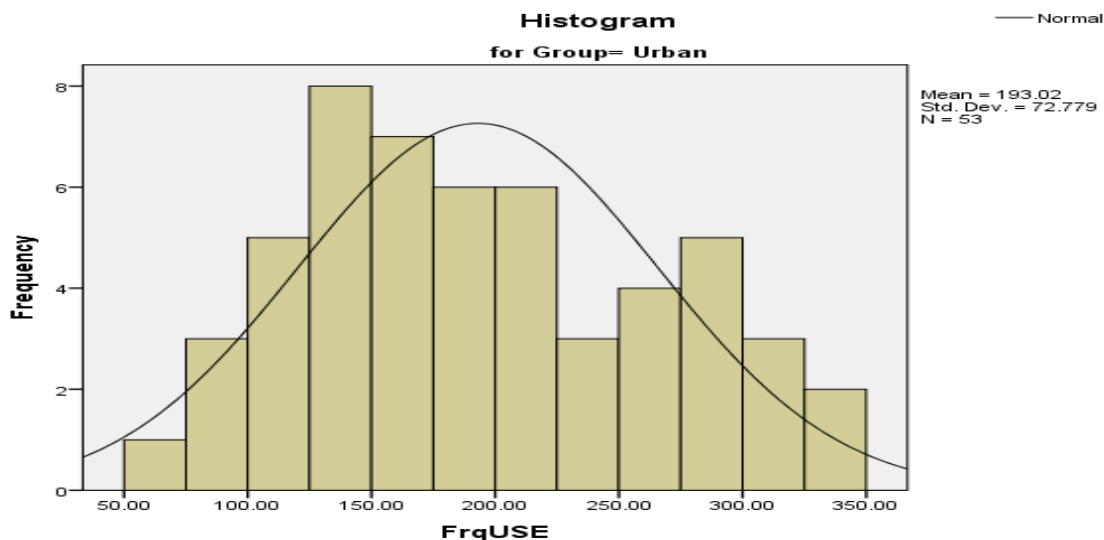
Figure 4: Normality histogram for perceived frequency of usage (FrqUSE) of classroom assessment of rural mathematics teachers, with normal curve displayed.
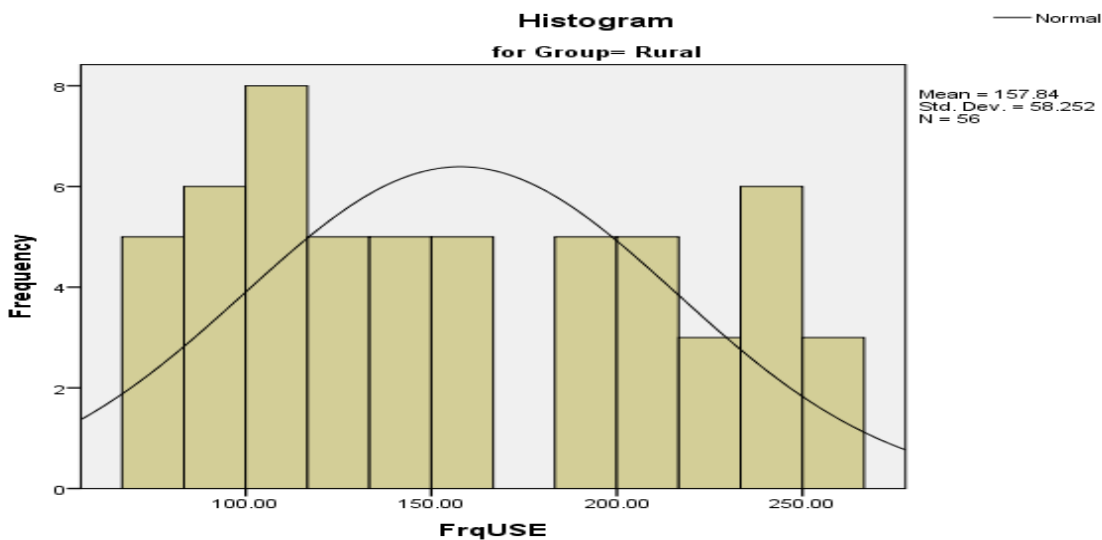
Figure 5: Normality histogram for perceived skill in usage (SklUSE) of classroom assessment of urban mathematics teachers, with normal curve displayed.
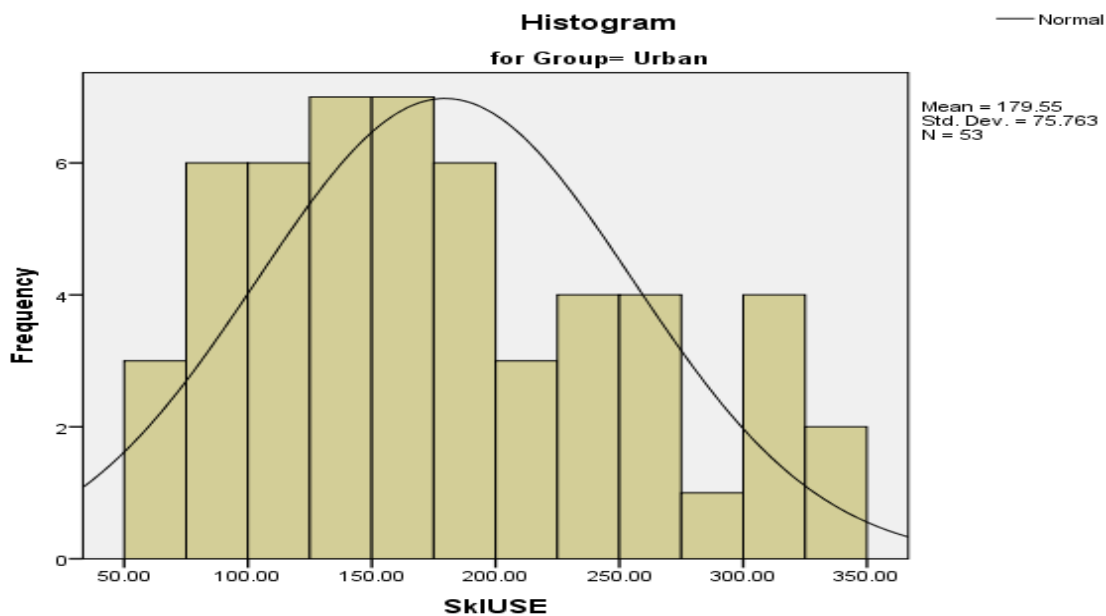
Figure 6: Normality histogram for perceived skill in usage (SklUSE) of classroom assessment of rural mathematics teachers, with normal curve displayed.
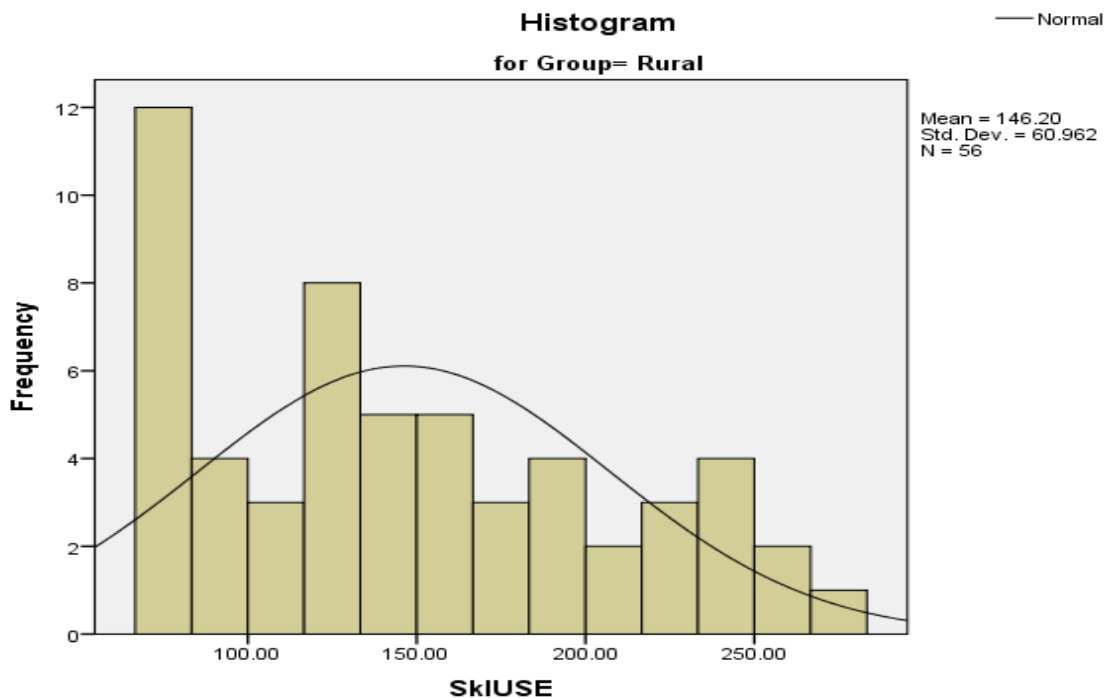
In addition to the normality test conducted by visual examination of normality histograms for each of the overall test variables, the skewness and kurtosis values generated in the SPSS output were also used to determine normality. The skewness measures the symmetry of the distribution and kurtosis defines the shape of the distribution (Green & Salkind, 2011). According to Green and Salkind (2011), if the skewness and kurtosis values fall within a range of +/- twice the value of the standard error for skewness and kurtosis, then the distribution is considered normal (Salkind & Green, 2011). These values confirm the visual examination of normality observed in the normality histograms in Figures 3, 4, 5, and 6. The skewness and kurtosis values for all dependent variables are presented in Table 6.

Table 6. *Skewness and Kurtosis Values for All Dependent Variables*

Variable		N	Skewness		Kurtosis	
		Statistic	Statistic	Std. Error	Statistic	Std. Error
Perceived	Urban	53	.227	.327	-1.066	.644
frequency of	Rural	56	.306	.319	-1.243	.628
usage						
Perceived	Urban	53	.521	.327	-.676	.644
skill in usage	Rural	56	.387	.319	.975	.628

Assumption 3

The Levene's test was used to test if there were homogeneity of variances in the overall samples (equal variances across samples). Levene's results for the overall variables were above the .05 level which means that the law of equal variance was confirmed. The Levene's test results for equality of variances are displayed in Table 7.

Table 7. *Levene's Test for Equality of Variances*

Variables		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2 tailed)	Mean Difference	Std. Error Difference	95 % Confidence Interval of the Difference		
									Lower	Upper	
Frequent	Equal variances assumed	3.029	.085	2.794	107	.006	35.180	12.593	10.215	60.144	
USE	Equal variances not assumed			2.777	99.567	.007	35.180	12.670	10.041	60.318	
Skilled at	Equal variances assumed	2.206	.140	2.539	107	.013	33.351	13.138	7.307	59.395	
Use	Equal variances not assumed			2.523	99.817	.013	33.351	13.216	7.130	59.571	

The Levene's test for equality of variances was also conducted on the data obtained from all seven (7) categories of the two-part API. Levene's test was not tenable for all categories of the API. Violations of homogeneity of variances across the categories were not a major threat to the study as the law of equal variances was confirmed for the overall results. Levene's test for equality of variances across the categories of perceived frequency of usage and perceived skill in usage of classroom assessment are summarized in Tables 8 and 9 respectively.

Table 8. *Levene's Test for Equality of Variances on the API categories (Perceived frequency of usage)*

Variables		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2 tailed)	Mean Difference	Std. Error Difference	95 % Confidence Interval of the Difference	
									Lower	Upper
FrqDevPap	Equal variances assumed	7.606	.007	.815	107	.417	1.913	2.347	-2.740	6.566
	Equal variances not assumed			.807	91.457	.422	1.913	2.371	-2.796	6.622
FrqIntR	Equal variances assumed	.026	.872	1.727	107	.087	3.629	2.102	-.537	7.80
	Equal variances not assumed			1.726	106.37	.087	3.629	2.103	-.540	7.80
FrqDevPerfA	Equal variances assumed	2.266	.135	4.255	107	.000	7.333	1.723	3.916	10.749
	Equal variances not assumed			4.243	104.48	.000	7.333	1.728	3.9058	10.759
FrqComTestR	Equal variances assumed	2.910	.091	3.406	107	.001	4.994	1.466	2.087	7.901
	Equal variances not assumed			3.390	102.23	.001	4.994	1.473	2.0725	7.915
FrqNonAchGd	Equal variances assumed	.146	.703	2.518	107	.013	8.477	3.367	1.802	15.152
	Equal variances not assumed			2.514	105.80	.013	8.477	3.372	1.792	15.162
FrqEthsAsmt	Equal variances assumed	6.863	.010	2.755	107	.007	3.895	1.414	1.0928	6.700
	Equal variances not assumed			2.733	95.207	.007	3.895	1.425	1.065	6.725
FrqGrad	Equal variances assumed	4.900	.029	3.613	107	.000	4.939	1.367	2.229	7.648
	Equal variances not assumed			3.592	99.930	.001	4.939	1.375	2.211	7.666

Table 9. *Levene's Test for Equality of Variances on the API categories (Perceived skill in usage)*

Variables		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2 tailed)	Mean Differe nce	Std. Error Differe nce	95 % Confidence Interval of the Difference	
									Lower	Upper
SklDevPap	Equal variances assumed	1.191	.278	1.698	107	.092	5.237	3.085	-.879	11.351
	Equal variances not assumed			1.691	102.79	.094	5.237	3.097	-.906	11.380
SklIntR	Equal variances assumed	1.489	.225	1.985	107	.050	5.466	2.754	.007	10.925
	Equal variances not assumed			1.983	106.13	.050	5.466	2.756	.002	10.931
SklDevPerfA	Equal variances assumed	.370	.544	2.046	107	.043	3.111	1.520	.0967	6.124
	Equal variances not assumed			2.040	104.36	.044	3.111	1.525	.0871	6.134
SklComTestR	Equal variances assumed	2.548	.113	1.908	107	.059	1.922	1.008	-.0754	3.920
	Equal variances not assumed			1.894	97.982	.061	1.922	1.015	-.0914	3.936
SklNonAchGd	Equal variances assumed	13.18	.000	4.102	107	.000	13.263	3.233	6.853	19.674
	Equal variances not assumed			4.040	79.282	.000	13.263	3.282	6.730	19.797
SklEthsAsmt	Equal variances assumed	1.672	.199	.747	107	.457	.910	1.218	-1.506	3.325
	Equal variances not assumed			.741	97.632	.460	.910	1.227	-1.525	3.345
SklGrad	Equal variances assumed	.000	.986	2.384	107	.019	3.442	1.444	.5798	6.304
	Equal variances not assumed			2.386	106.91	.019	3.442	1.443	.5819	6.302

Results

Null Hypothesis 1(a-b).

To assess research question one, an independent sample *t*-test was used to compare the mean scores on the measures to determine if there were statistically significant differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. The overall perceived frequency of usage results from the API determined that statistical significant differences in perceived frequency of usage of classroom assessment practices between mathematics teachers in urban secondary schools (*M* = 193.02, *SD* =72.78) and mathematics teachers in rural secondary schools in England (*M* = 157.84, *SD* = 58.25); *t* (107) = 2.794, *p* = .006, thus allowing for the rejection of Null Hypothesis 1. The mean difference for the analysis was found to be 35.18, 95% CI: 10.04 to 60.32. The effect size for this analysis (*d* = .53) confirmed with Cohen's (1988) convention for a moderate effect size (*d* = .50). These results indicate statistically significant differences in perceived frequency of usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. A mean difference of 35.18 suggested that mathematics teachers in urban secondary schools in England perceived themselves as using the surveyed assessment categories more frequently than mathematics teachers in rural secondary schools in England. The means, standard deviation, and *t*-test results for the overall results are displayed in Table 10.

Table 10. *Means, Standard Deviation, and t-test Results (Frequent Use)*

Group	*N*	*M*	*SD*	*t*	*P*
Urban Mathematics Teachers	53	193.02	72.78	2.794	.006
Rural Mathematics Teachers	56	157.84	58.25		

In addition, the means, standard deviations, and *t*-test results that were calculated for each groups (urban and rural mathematics teachers on all seven categories of the API. In all cases, the mean scores on the measures for mathematics teachers from urban secondary schools was higher than the mean scores on the measures for mathematics teachers from rural secondary schools. The results determined that statistically significant differences in perceived frequency of usage existed in all but two categories of the API (Developing and administering test; and Interpreting test results) between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England, thus confirming the rejection of Hypotheses 1. These results are reported in Table 11.

Table 11. Means, Standard Deviation, and t-test Results from the API Categories (Perceived frequency of usage).

Categories	Urban		Rural			
	M	*SD*	*M*	*SD*	*t*	*P*
Developing and Administering test.	50.38	14.36	48.46	9.85	.807	.422
Interpreting test results	31.41	11.09	27.79	10.85	1.727	.087
Developing and using informal assessment	24.21	9.44	16.88	8.54	4.255	.000
Communicating test results	16.89	8.26	11.89	7.02	3.406	.001
Non-Achievement based grading	35.57	18.02	27.09	17.13	2.518	.013
Ethics in Assessment	17.37	8.44	13.48	6.20	2.733	.007
Grading	17.19	7.87	12.25	6.35	3.592	.001

Null Hypothesis 2 (a-b)

To assess research question two, an independent sample *t-test* was used to compare the mean scores on the measures to determine if there were statistically significant differences in the perceived skill in usage of classroom assessment practices (as measured by the Assessment Practices Inventory 8.0) between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. The overall results from the API determined that statistically significant differences with the perceived skill in usage of classroom assessment practices in mathematics between mathematics teachers in urban secondary schools (M = 179.54, SD = 75.76) and mathematics teachers in rural secondary schools in England (M = 146.20, SD = 60.96); t (107) = 2.539, p = .013, thus allowing for the rejection of Null Hypothesis 2. The mean difference for the analysis was found to be 33.35, 95% CI: 7.31 to 59.40. The effect size for this analysis (d = .48) confirmed with Cohen's (1988) convention for a moderate effect size. These results indicate significant differences in the perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. A mean difference of 33.35 is a strong indication that mathematics teachers in urban secondary schools in England perceived themselves as more skilled in using classroom assessment practices than mathematics teachers in rural secondary schools in England. The means, standard deviation, and *t-test* results are displayed in Table 12.

Table 12. *Means, Standard Deviation, and t-test Results (Perceived skill in usage)*

Group	N	M	SD	t	P
Urban Mathematics Teachers	53	179.54	75.76	2.539	.013
Rural Mathematics Teachers	56	146.20	60.96		

The means, standard deviations and *t*-test results were calculated for each group (urban

and rural mathematics teachers) on all seven categories of the API. In all categories, the mean for

mathematics teachers from urban secondary schools was higher than the mean for mathematics

teachers from rural secondary schools. The results determined that statistically significant

differences in perceived skill in usage existed in three categories of the API (Non-achievement

based grading; Developing and using informal assessment; and grading) between mathematics

teachers in urban secondary schools and mathematics teachers in rural secondary schools, thus

confirming the rejection of Hypotheses 2. These results are reported in Table 13.

Table 13. Means, Standard Deviation, and t-test Results from the API

Categories (Perceived skill in usage).

Categories	Urban		Rural			
	M	*SD*	*M*	*SD*	*t*	*P*
Developing and Administering test.	40.42	17.28	35.18	14.89	1.698	.092
Interpreting test results	33.04	14.62	27.57	14.12	1.985	.050
Developing and using informal assessment	23.40	8.35	20.29	7.52	2.046	.043
Communicating test results	17.54	5.90	15.63	4.57	1.908	.059
Non-Achievement based grading	33.58	21.13	20.32	11.48	4.040	.000
Ethics in Assessment	14.98	7.15	14.07	5.50	.747	.457
Grading	16.58	7.43	13.14	7.63	2.384	.019

Summary

The study revealed that all three underlying assumptions for the independent sample *t-test* was tenable. Null hypothesis 1(a-b) addressed the differences in perceived frequency of usage of classroom assessment practices in mathematics (as measured by the Assessment Practices Inventory 8.0) between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. The study determined that mathematics teachers in urban secondary schools in England perceived themselves as using the surveyed assessment categories more frequently than mathematics teachers in rural secondary schools in England, with a mean difference of 35.18. Although urban mathematics teachers scored higher perceived frequency of usage across all categories of the API than rural mathematics teachers, the study revealed that there were no statistically significant differences in the mean scores in two categories: frequency of usage in developing and administering test; and frequency of usage in interpreting test results. Null hypothesis 2 addressed the differences in the perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. The study determined that mathematics teachers in urban secondary schools in England perceived themselves as more skilled in using classroom assessment practices than mathematics teachers in rural secondary schools in England, with a mean difference of 33.35. Although urban mathematics teachers scored higher perceived skill in usage across all categories of the API than rural mathematics teachers, the study revealed that there were no statistically significant differences in the mean scores in four categories: developing and administering test; interpreting test results; communicating test results; and ethics in assessment. The level of significance of the results will be discussed in light of the related literature and the theoretical framework in chapter 5.

CHAPTER 5: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this causal-comparative study was to compare the mean scores on the measures to determine if there were differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. The study determined statistically significant differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices in mathematics between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England.

Mathematics teachers in urban secondary schools were found to perceive themselves as using the surveyed assessment categories more frequently than mathematics teachers in rural secondary schools in England. The study also determined that mathematics teachers in urban secondary schools in England perceived themselves as more skilled in using classroom assessment practices than mathematics teachers in rural secondary schools in England. This chapter will review the results of each hypothesis outlined in the previous chapter in light of the related literature and theoretical framework that guided this causal-comparative study. This chapter is divided in five main areas as follows: summary of findings, discussion and implications, conclusions, limitations, and recommendations.

Summary of Findings

Null Hypothesis 1

The research question asked if there was a difference in perceived frequency of usage of classroom assessment in mathematics. The null hypothesis stated that there was no statistically significant difference in perceived frequency of usage of classroom assessment in mathematics between mathematics teachers in rural secondary schools and mathematics teachers in urban secondary schools in England. The result from the independent sample t-test determined that the null hypothesis should be rejected, and there was a statistically significant difference, with a moderate effect size ($d = .53$).

Null Hypothesis 2

The research question asked if there was a difference in perceived skill in usage of classroom assessment practices in mathematics between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. The null hypothesis stated that there was no statistically significant difference in perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. The result from the independent sample *t*-test determined that the null hypothesis should be rejected, and there was a statistically significant difference, with a moderate effect size (*d* = .48).

Discussion and Implications

Perceived Frequency and Perceived Skill in Usage of Classroom Assessment Practices

The baseline and demographic data of the secondary school mathematics teachers in the study revealed that the median age range for urban secondary school mathematics teachers (30-39 years) is significantly lower than that of rural secondary school mathematics teachers (40-49 years) in England. This result showed that mathematics teachers working in urban secondary schools have higher perceived frequency of usage and perceived skill in usage of classroom assessment practices than mathematics teachers of similar age range working in rural secondary schools in England.

The descriptive statistics for both groups showed that mathematics teachers in urban secondary schools in England perceived themselves as using the surveyed assessment categories more frequently (*M* = 193.02, *SD* = 72.78) than mathematics teachers in rural secondary schools in England (*M* = 157.84, *SD* = 58.25). The study also revealed statistically significant differences in the mean scores on the measures across the following categories of the API: perceived frequency of usage developing and using informal assessments; perceived frequency of usage when communicating test results; perceived frequency of usage with non-achievement based grading; perceived frequency of usage of ethics in assessment; perceived frequency of usage grading;

perceived skill in developing and using informal assessments; perceived skill in usage with non-achievement based grading; and perceived skill in usage of grading.

Because statistically significant differences were present in this study, it is possible that perceived frequency of usage and perceived skill in usage of classroom assessment practices in mathematics is influenced by urban/rural classification. Prior research by Panizzon and Pegg (2008) suggested that teachers employed to urban schools differ in their perceptions of teaching and learning from teachers employed to rural secondary schools. The researchers found that teachers employed to rural schools are less likely to approach teaching and learning from an exploratory and discovery point of view, whereas teachers employed to urban schools are far more likely to approach teaching from a more contemporary style of delivery. While this study does not directly support the aforementioned findings because it did not attempt to replicate the research, the findings of this study do support their claim that teachers differ in their perceptions based on urban/rural classification.

In addition, the results determined higher perceived frequency of usage in developing and administering test for urban mathematics teachers (M=50.38), while rural mathematics teachers (M=48.46) reported lower self-perceived scores on the same category. A similar pattern exists with higher perceived skill in usage in developing and administering test for urban mathematics teachers (M=40.42), while rural mathematics teachers were lower (M=14.89). Based on the findings in this study, urban mathematics teachers have perceived themselves to be more self-assured when developing test based on clearly defined content objectives and administering such test with a high degree of confidence.

The practices in communicating test results and giving feedback were dissimilar for mathematics teachers from urban and rural schools. Urban mathematics teachers have reported higher perceived frequency of usage in communicating test results (M=16.89), while rural mathematics teachers (M=11.89) have reported lower scores on the same measure. Equally, higher perceived skill in usage in communicating test results and giving feedback was reported for urban

mathematics teachers (*M*=17.54), while lower scores were reported for rural mathematics teachers (*M*=15.63). This practice may be as a result of urban secondary school mathematics teachers in this study having longer average years of services (10.98 years) than rural mathematics teachers (9.98 years), consequently they are more experience in the classroom, a finding that contradicts Zang and Bury-Stock's (1994) findings. According to Zang and Bury-Stock (1994) a relationship does not exist between teachers' self-perceived assessment skills and years of teaching experience.

The pattern in grading was different for both groups of teachers. Urban mathematics teachers reported higher perceived frequency of grading (*M*=17.19), while rural mathematics teachers (*M*=12.25) reported lower scores on the same measure.   A parallel trend exists with higher perceived skill in usage in grading for urban mathematics teachers (*M*=16.58), while rural mathematics teachers were lower (*M*=13.14). The research literature suggests that by providing students with quality feedback about their learning an opportunity will be provided for students to improve the quality of their work. Furthermore, by providing quality feedback the desired learning outcomes will be achieved (Kubiszyn & Borich, 2013). The low self-perceived scores reported by mathematics teachers in rural secondary schools may suggest that these teachers will find it extremely difficult to provide the quality feedback and guidance that learners will need in order to improve the quality and product of their learning (McMillan, Myran, & Workman, 2002).

Vygotsky's Theory of Cognitive Development

The result of this research supports Vygotsky's Theory of Cognitive Development (1962), a theoretical framework that underpins this study. The theory states that students learn through active engagement within the social setting. The concept of active engagement takes place in group activities and classroom discussions which are also responsible for the transfer of knowledge and skills from a more knowledgeable to a less knowledgeable learner. Furthermore, having a sound understanding of the concept of active engagement within the mathematics classroom could challenge the low perceived frequency of usage and low perceived skill in usage of classroom assessment practices held by many mathematics teachers in rural secondary schools. Secondly, by

having an understanding of Vygotsky's cognitive development theory (1962) mathematics teachers can better self-perceive their skill in usage of classroom assessment materials. Approaching assessment inventory from the social constructivist perspective could challenge the low self-perceived frequency of usage and the low self-perceived skill in usage of classroom assessment practices reported by mathematics teachers in rural secondary schools.

Social Cognitive Theory

The second theoretical framework that underpins this study was Bandura's social cognitive theory (Bandura, 2001). Albert Bandura's Social Cognitive theory posits that people can learn by observing or imitating others within the social environment (Bandura, 2001). This theory clearly suggests that students in the mathematics classroom will need mathematics teachers to imitate, observe and model the appropriate classroom assessment skills (Blair, 2004). The mathematics curriculum in England provides the basis for frequent and effective use of classroom assessment strategies to be demonstrated by mathematics teachers. Through these types of teaching and learning experiences, students will be better able to model, observe, imitate the desired learning behavior, and practice the required skills at the appropriate grade level. Consequently, through observation, imitation, and modelling students will be better able to learn the desired behavior in the classroom (Boyce, 2011).

Furthermore, the low self-perceived frequency of usage and the low self-perceived skill in usage of classroom assessment practices reported by rural mathematics teachers can be improved by observing, modelling, and imitating classroom assessment inventory conducted by a more experienced professional.   Bonner and Chen (2009) argued that teachers are willing to accept nonstandard ways of conducting classroom assessment rather than performing classroom assessments based on curriculum standards. Providing a more experienced professional as a role model could challenge the low self-perceived skill in usage of classroom assessment practices reported by mathematics teachers in rural secondary schools in England. As was previously reported in this study, urban secondary school mathematics teachers have higher self-perceived

frequency of usage, self- perceived skill in usage, and longer average years of services.

Skinner's Theory of Operant Conditioning

Skinner's Theory of Operant Conditioning is the final theoretical framework that underpins this study. The theory suggests that consequences are used to modify or achieve a particular behavior (Pitts, 1997). In general, mathematics teachers in secondary schools are sometimes required to provide targeted interventions geared at supporting students who are struggling to achieve academically. A creative and practical approach to classroom assessment could be the solution to the problem. By encouraging the use of incentives, praises, and rewards, mathematics teachers in rural secondary schools could help students to access the curriculum and narrow the gap in learning. This view of the use of classroom assessment may result in higher self-perceived frequency of usage and higher self- perceived skill in usage of classroom assessment practices among mathematics teachers in rural secondary schools in England.

Limitations

There were numerous limitations presented in this causal-comparative study. Firstly, the research utilized a causal-comparative research design which means that the research design was non-experimental, and the variables in the research could not be manipulated or randomly assigned (Creswell, 2013).

Secondly, the instrument that was used to collect data in this research was created and used in the United States 20 years ago. It is likely that the population in this study is different from the population the instrument was initially validated against.

Thirdly, the selection of participants to be included in the sample was also a limitation to the study. A large number of participants who were originally identified and were selected to be included in the sample did not participate. As a result, the selection process had to be extended for a longer period and new participants were selected and included in the sample. Less than 5% of the total number of mathematics teachers employed to secondary schools in England were represented in the study. In addition, because teachers were identified from a published staff listing, a number

of staff could have been excluded from the list due to administrative error.

Finally, the limited number of schools involved was also a limitation to the study. Less than 5% of all mathematics teachers and less than 5 % of secondary schools in England is not a representative of the country as a whole. As a result, the generalizability of the findings across the nation is limited.

Delimitations

The main delimitations set by the researcher was on basis of the selection of participants for the sample. The participants in the study were delimited to individuals who have attained a minimum of two years teaching experience and are recognized as fully qualified mathematics teachers by the General Teaching Council of England (GTCE). The study excluded unqualified mathematics teachers and mathematics teachers with less than two years' teaching experience. Mathematics teachers with less than two years' experience could have had different self-perceived frequency of usage and self-perceived skill in usage of classroom assessment practices in mathematics which was not taken into account by this study.

Mathematics teachers outside the age range of 20-70 years were also delimited from the study. Mathematics teachers outside the delimited age range could have had higher self-perceived frequency of usage and higher self- perceived skill in usage of classroom assessment practices in mathematics.

Conclusions

A consistent approach to the use of classroom assessment in mathematics at the secondary school level is a slow process in England. A significant portion of mathematics teachers in secondary schools are struggling with the use of classroom assessment strategies. Yet research has shown that effective classroom assessment strategies are essential tools for closing the gaps between disadvantaged groups and high achievers in the classroom (Office for Standards in Education, 2014). The problem has typically been that many mathematics teachers are opposed to the use of classroom assessment because they perceived it to be ineffective, not beneficial for all

students and difficult to deliver.

This study explored the differences in self-perceived frequency of usage and self-perceived skill in usage of classroom assessment practices. The results of the study identified differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools. The research revealed that mathematics teachers in urban secondary schools have higher self-perceived frequency of usage and higher self-perceived skill in usage of classroom assessment practices than mathematics teachers in rural secondary schools.

The study also revealed higher self-perceived differences in the following categories of the API: perceived frequency of usage developing and using informal assessments; perceived frequency of usage when communicating test results; perceived frequency of usage with non-achievement based grading; perceived frequency of usage of ethics in assessment; perceived frequency of usage grading; perceived skill in developing and using informal assessments; perceived skill in usage with non-achievement based grading; and perceived skill in usage of grading. The findings of the study suggest that mathematics teachers in rural secondary schools need ongoing training, monitoring, and support with classroom assessment practices. Approaching staff development from this perspective could challenge the low self- perceived frequency of usage and self-perceived skill in usage of classroom assessment practices held by mathematics teachers on a whole.

Recommendations

Based on the results drawn from this study, it is recommended that more classroom assessment training should be provided at the university level for pre-service mathematics teachers' preparation, as well as ongoing training, monitoring, and support for in-service mathematics teachers. The more experience, knowledge and skills that these mathematics teachers receive, the more equipped they will become in meeting the diverse learning needs of students in the classroom (Akos, Cockman, & Strickland, 2007). Furthermore, this could challenge the low self-perceived

frequency of usage and low self-perceived skill in usage held by mathematics teachers, especially those mathematics teachers in rural secondary schools.

It is also recommended that the importance of classroom assessment practices should be expressed to all teachers, but particularly to mathematics teachers in rural secondary schools. Mathematics teachers in rural secondary schools should be aware that the frequency of usage and skill in usage of classroom assessment is essential to students' success in mathematics (Office for Standards in Education, 2014). This could be achieved through targeted continued professional development designed to help teachers recognize the importance of classroom assessment practices as an important feature in supporting the quality of teaching and learning in schools (Office of Standards in Education, 2014). In addition, teachers' union and other professional organizations, such as The Association of Teachers and Lecturers (ATL), National Association of School Union of Women Teachers (NASWUT) and Association of School Leaders (ASCL) must stress the importance of frequent use of classroom assessment practices to their members.

Finally, it is recommended that a professional network of mathematics teachers should be created by the Department for Education. This could be achieved through virtual learning groups and/or by creating a link between rural and urban secondary schools, thereby, challenging the low self-perceived frequency of usage and self-perceived skill in usage of classroom assessment practices held by mathematics teachers in rural secondary schools.

Recommendations for Future Research

This study highlighted the differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices between mathematics teachers in urban secondary schools and mathematics teachers in rural secondary schools in England. In light of the findings, the research exposed areas where more research is needed to be conducted in order to add to the existing findings and fill the gaps identified in the study.

The research determined that mathematics teachers in urban secondary schools have perceived themselves as using the surveyed assessment categories more frequently and are more

skilled in usage than mathematics teachers in rural secondary schools in England. However, the research did not determine why mathematics teachers in urban secondary schools have perceived themselves as using the surveyed assessment categories more frequently and are more skilled in usage than mathematics teachers in rural secondary schools. As well as, to determine why mathematics teachers in rural secondary schools have perceived themselves as using the surveyed assessment categories less frequently and are perceive themselves as less skilled in usage than mathematics teachers in urban secondary schools in England. This information could prove useful for instructional coaches, school administrators, and other school leaders with responsibility for improving school culture and staff professional development (Allen, Ort, and Schmidt, 2009).

This study could be repeated with different populations. Some possible participants could be teachers of specific grade levels, teachers with specific levels of qualification, teachers working in faith schools, teachers working in Alternative Provisions (AP), teachers working in Pupil Referral Units (PRU), and teachers of a specific Local Education Authority (LEA). Other studies could be conducted to compare the differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices between mathematics teachers trained outside the European Union (EU) to mathematics teachers trained within the European Union (EU) to determine if the same differences exist between the two groups.

Furthermore, a population of newly qualified mathematics teachers (NQT) could be compared to a population of more experienced mathematics teachers to determine if the differences in perceived frequency of usage and perceived skill in usage of classroom assessment practices in mathematics are influenced primarily by training. Future research could also be conducted to determine if the same difference exists in smaller geographic areas in England or other parts of the United Kingdom. This type of research would provide additional information for deeper statistical analysis which would be more generalizable.

REFERENCES

Aaron, W. R., & Herbst, P. G. (2015). Teachers' perceptions of students' mathematical work while making conjectures: An examination of teacher discussions of an animated Geometry classroom scenario. *International Journal of STEM Education*, *2*(1), 1-13.

Abrams, L. M., Pedulla, J. J., & Madaus, G. F. (2003). Views from the Classroom: Teachers' Opinions of Statewide Testing Programs. *Theory into Practice*, *42*(1), 18–29.

Adnan, M., & Zakaria, E. (2010). Exploring beliefs of pre-service mathematics teachers: A Malaysian perspective. *Asian Social Science*, *6*(10), 152-159.

Akos, P., Cockman, C. R., & Strickland, C. A. (2007). Differentiating classroom guidance. *Professional School Counseling, 10*(5), 455-463. Retrieved from EBSCOhost.

Alkharusi, H., Aldhafri, S., Alnabhani, H., & Alkalbani, M. (2014). Classroom assessment: Teacher practices, students perceptions, and academic self- efficacy beliefs. *Social Behavior and Personality, 42*(5), 835-855. Retrieved from EBSCOhost.

Allen, D., & Fraser, B. J. (2007). Parent and student perceptions of classroom learning environment and its association with student outcomes. *Learning Environments Research*, *10*(1), 67-82.

Allen, J., Gregory, A., Mikami, A., Lun, J., Hamre, B., & Pianta, R. (2013). Observations of effective teacher-student interactions in secondary school classrooms: Predicting student achievement with the classroom assessment scoring system--secondary. *School Psychology Review*, *42*(1), 76-98. Retrieved from EBSCOhost

Allen, D., Ort, S. W., & Schmidt, J. (2009). Supporting Classroom Assessment Practice: Lessons from a Small High School. *Theory into Practice*, *48*(1), 72-80

Andrews, P., & Hatch, G. (1999). A new look at secondary teachers' conceptions of mathematics and its teaching. *British Educational Research Journal*, *25*(2), 203-223.

Antoniou, P., & James, M. (2014). Exploring formative assessment in primary school classrooms: Developing a framework of actions and strategies. *Educational*

Assessment, Evaluation and Accountability, *26*(2), 153-176. Retrieved from EBSCOhost.

Bandura, A. (2001). Social Cognitive Theory of Mass Communication. *Media Psychology*, *3*(3), 265-299.

Blair, A. (2004). Peer interaction. *Mathematics Teaching,* 186, 36-38.

Bond, N. (2011). Preparing preservice teachers to become teacher leaders. *The Educational Forum*, *75*(4), 280-297.

Bong, M. (2008). Effects of parent-child relationships and classroom goal structures on motivation, help-seeking avoidance, and cheating. *The Journal of Experimental Education*, *76*(2), 191-201,203-204,206-217.

Bonner, S., & Chen, P. (2009). Teacher candidates' perceptions about grading and constructivist teaching. *Educational Assessment*, *14*(2), 57-77.

Boyce, T. E. (2011). Applying social learning theory. *Training Journal*, 31-34. Retrieved from EBSCOhost.

Brookhart, S. M... (1993). Teachers' Grading Practices: Meaning and Values. *Journal of Educational Measurement*, *30*(2), 123–142.

Calculator, S. N., & Black, T. (2009). Validation of an inventory of best practices in the provision of augmentative and alternative communication services to students with severe disabilities in general education classrooms. *American Journal of Speech - Language Pathology, 18*(4), 329 - 42. Retrieved from EBSCOhost.

Campbell, C., & Evans, J. (2000). Investigation of preservice teachers' classroom assessment practices during student teaching. *The Journal of Educational Research*, *93*(6), 350. Retrieved from EBSCOhost.

Cheng, L., Rogers, T., & Hu, H. (2004). ESL/EFL instructors' classroom assessment practices:

Purposes, methods, and procedures. *Language Testing*, *21*(3), 360-389. Retrieved from EBSCOhost.

Clark, R., (2014). Correlation Study: The Effect of Student-Teacher Rapport on High School Student Performance Rate. Digital Commons@ Liberty University.

Crockett, M. D., Namikawa, T., Zilimu, J., & Lee, S. H. (2012). Eighth grade mathematics teachers' formative assessment practices in SES-different classrooms: A Taiwan study. *International Journal of Science and Mathematics Education*, *10*(3), 553-579. Retrieved from Retrieved from EBSCOhost.

Croft, S. J., Roberts, M. A., & Stenhouse, V. L. (2016). The perfect storm of education reform: High-stakes testing and teacher evaluation. *Social Justice, 42*(1), 70-92,147.

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd Ed.). Thousand Oaks, CA: Sage Publications, Inc.

Department for Education (2012). *The condition of Education.* London: HMSO.

Dixon, H., (2011) Infusing peer assessment into classroom programmes: descriptions of practice. *Set: Research Information for Teachers* [Wellington], (2), 3 Retrieved from EBSCOhost.

Dobrow, S. R., Smith, W.K., & Poner, M.A. (2011). Managing the Grading Paradox: Leveraging the Power of Choice in the Classroom. *Academy Of Management Learning & Education*, *10*(2), 261-276.

Elkatms, M. (2012). An analysis of perceptions of classroom teachers regarding their use of alternative assessment and evaluation techniques in the Turkish course. *Educational Research and Reviews*, *7*(29), 663-669. Retrieved from EBSCOhost.

Emberger, M. (2007). Helping teachers improve classroom assessments. *Principal Leadership, 7*(9), 24-29

Ernest, P. (1991) *The Philosophy of Maths Education London*: The Falmer Press.

Filer, A. (2000). Assessment: social practice and social product. London: Routledge/Falmer.

Frey, B. B., & Schmitt, V. L. (2010). Teachers' classroom assessment practices. *Middle Grades Research Journal, 5*(3), 107+.

Gall, M. D., Gall, J. P., & Borg, W. R. (2006). *Educational research: An introduction* (8th ed.). New York, NY: Allyn & Bacon. Retrieved from EBSCOhost.

Gomez Zwiep, S., Benken, B., (2013). Exploring teachers' knowledge and perceptions across mathematics and science through content- rich learning experiences in a professional development setting. *International Journal of Science and Mathematics Education*, 11(2), 299-324.

Green, S. B. & Salkind N. J. (2013). *Using SPSS for Windows and Macintosh: Analyzing and Understanding Data* (7 th. ed). Boston: Pearson. New York, NY: Allyn & Bacon.

Gür, G., Çakiroglu, J., & Aydin, Y. Ç. (2012). Investigating predictors of sense of efficacy beliefs of classroom, science, and mathematics teachers. *Egitim Ve Bilim*, *37*(166), 68+

Hanson, M. J. S., & Carpenter, D. R. (2011). Integrating cooperative learning into classroom testing: implications for nursing education and practice. *Nursing Education Perspectives*, *32*(4), 270+.

Hodge, A., Gerberry, C., Moss, E., & Staples, M (2010). Purposes and perceptions: What do university mathematics professors see as their role in the education of secondary mathematics teachers? *Primus: Problems, Resources, and Issues in Mathematics Undergraduate Studies*, *20*(8), 646-663.

Hyland, T. (1998). Exporting failure: The strange case of NVQs and overseas markets. *Educational Studies*, *24*(3), 369-380.

Igbalajobi, O. (1983). A needs assessment for an in service training program for elementary classroom teachers of mildly handicapped children in Nigeria. *International Education*, *12*(2), 18.

Isaksen, J., & Holth, P. (2009). An operant approach to teaching joint attention skills to children with autism. *Behavioral Interventions*, *24*(4), 215-236.

Isbell, L., & Szabo, S. (2015). Assessment: Teacher efficacy and response to intervention. *Delta Kappa Gamma Bulletin*, *81*(2), 41-46.

Kubiszyn, T., & Borich, G., D. (2013). *Educational testing & measurement: Classroom applications and practice* (10th ed.). Hoboken, NJ: Wiley.

Kunter, Mareike; Tsai, Yi-Miau; Klusmann, Uta; Brunner, Martin; Krauss, Stefan; Baumert, Jürgen. (2008). Students' and mathematics teachers' perceptions of teacher enthusiasm and instruction. *Learning and Instruction*, *18*(5), 468-482.

King, D. S. (1989). Political centralization and state interests in britain - the 1986 abolition of the GLC and MCCs. *Comparative Political Studies*, *21*(4), 467-494

Jane, S. M. (2013). A vision of improvement of learning: South African teachers' conceptions of classroom assessment. Perspectives in Education, *31*(2), 14-21. Retrieved from EBSCOhost.

Jones, K., Jones, J.., & Vermette, P (2010). The Constructivist Mathematics Classroom. *Mathematics Teaching,* 219, 33-35. Retrieved from EBSCOhost.

Lambert, D., & Lines, D. (2000). *Understanding assessment: Purposes, perceptions, practice.* London: Routledge/Falmer.

Martin, D (2012). "Learning mathematics while Black." *Educational Foundations 26*.1-2

McMillan, J. H., Myran, S., & Workman, D. (2002). Elementary teachers' classroom assessment and grading practices. *The Journal of Educational Research, 95*(4), 203.

Minarechová, M. (2012). Negative impacts of high-stakes testing. *Journal of Pedagogy, 3*(1), 82

Moen, D., Davies, T., & Dykstra, D. V. (2010). Student perceptions of instructor classroom Management practices. *College Teaching Methods & Styles Journal*, *6*(1), 21-31.

Moseley, C., Bilica, K., Wandless, A., & Gdovin, R. (2014). Exploring the relationship between teaching efficacy and cultural efficacy of novice science teachers in high-needs schools. *School Science and Mathematics*, *114*(7), 315-325.

Muñoz, M., Scoskie, J., & French, D. (2013). Investigating the "black box" of effective teaching:

The relationship between teachers' perception and student achievement in a large urban district. *Educational Assessment, Evaluation and Accountability, 25*(3), 205-230.

Nagel, D. (2015). *Effective grading practices for secondary teachers: Practical strategies to prevent failure, recover credits, and increase standards-based/referenced grading*. Thousand Oaks, California: Corwin.

Negative effects of high-stakes testing. (2003). *Gifted Child Today, 26*(2), 6-7.

Office for Standards in Education (2014). *The condition of Education*. London: HMSO.

Ogunkola, B. J., & Archer-Bradshaw, R. (2013). Teacher quality indicators as predictors of instructional assessment practices in science classrooms in secondary schools in Barbados. *Research in Science Education*, *43*(1), 3-31. Retrieved from EBSCOhost.

Olele, C. N. (2012). Alternative assessment: Emerging trends of classroom assessment in digital era. Academic Research International, *3*(1), 42-49. Retrieved from EBSCOhost.

Panizzon, D & Pegg, J. (2008). Assessment Practices: Empowering Mathematics and Science Teachers in Rural Secondary Schools to Enhance Student Learning. *International Journal of Science and Mathematics Education*, 6(2), 417-436.

Perrone, M. (2011). The effect of classroom-based assessment and language processing on the second language acquisition of EFL students. *Journal of Adult Education*, *40*(1), 20-33. Retrieved from EBSCOhost.

Pitts, C. E. (1971). *Operant conditioning in the classroom: Introductory readings in educational psychology*. New York: Crowell.

Pyle, A., & Deluca, C. (2013). Assessment in the kindergarten classroom: An empirical study of teachers' assessment approaches. *Early Childhood Education Journal*, *41*(5), 373-380. Retrieved from EBSCOhost.

Ramirez, G., & Beilock, S. (2011). Writing about testing worries boosts exam performance in the classroom. *Science, 331*(6014), 211-213.

Range, B. G., Duncan, H. E., Scherz, S. D., & Haines, C. A. (2012). School leaders' perceptions

about incompetent teachers: Implications for supervision and evaluation. *National Association of Secondary School Principals. NASSP Bulletin*, *96*(4), 302-322.

Rowtree, D. (1987). New Jersey. *Assessing students: How shall we know them*? Library of Congress Cataloging –in- Publication Data.

Rubie-Davies, C., Peterson, E., Irving, E., Widdowson, D., & Dixon, R. (2010). Expectations of achievement: Student, teacher and parent perceptions. *Research in Education*, 83, 36-53. Retrieved from EBSCOhost.

Rutland, A., & Campbell, R. (1996). The relevance of Vygotsky's theory of the 'zone of proximal development' to the assessment of children with intellectual disabilities. *Journal Of Intellectual Disability Research*, *40*(2), 151-158.

Shriner, M., Schlee, B., Hamil, M., & Libler, R. (2009). Creating teachers' perceptual, behavioral, and attitudinal change using professional development workshops. *Teacher Development*, *13*(2), 125-134.

Stiggins, R. J., Conklin, N., & United, S. (1992). *In teachers' hands: Investigating the practices of classroom assessment*. Albany: State University of New York Press.

Walker, D. (2012). Classroom assessment techniques: An assessment and student evaluation method. *Creative Education*, *3*, 903-907.

Tice, T. N. (1997). Vygotsky/constructivism. *The Education Digest*, *63*(4), 47. Vygotsky, L.,

Vygotsky, L., Vakar, G., (1962). *The Development of Scientific Concepts in childhood*. Cambridge, MA, MIT Press

Vygotsky, L. S. (2011). The dynamics of the schoolchild's mental development in relation to teaching and learning. *Journal of Cognitive Education and Psychology*, *10*(2), 198-211. Retrieved from EBSCOhost.

Warner, R. (2013). *Applied statistics: From bivariate through multivariate techniques* (2nd ed.).

Thousand Oaks, CA: Sage Publications.

Wu, C., Lai, F., Shih, C., & Liao, C. (2015). Students' perceptions of the effectiveness of their homeroom teachers' leadership and classroom management at vocational high schools. *International Journal of Information and Education Technology*, *5*(5), 319-325.

Yin, Y., Olson, J., Olson, M., Solvin, H., & Brandon, P. R. (2014). Comparing two versions of professional development for teachers using formative assessment in networked mathematics classrooms. *Journal of Research on Technology in Education*, *474*(1), 41+.

Zacharos, K., Koliopoulos, D., Dokimaki, M., & Kassoumi, H. (2007). Views of prospective early childhood education teachers, towards mathematics and its instruction. European Journal of Teacher Education, *30*(3), 305-318.

Zhang, Z. (1995). *Investigating teachers' self-perceived assessment practices and assessment competencies on the Assessment Practices Inventory*. Tuscaloosa, AL: The University of Alabama.

Zhang, Z., & Burry-Stock, J. A. (1994). *Assessment Practices Inventory*. Tuscaloosa, AL: The University of Alabama. New York, NY: Allyn & Bacon.

Zientek, L. R. (2006). Do teachers differ by certification route? Novice teachers' sense of self-efficacy, commitment to teaching, and preparedness to teach. *School Science and Mathematics*, *106*(8), 326+.

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APPENDIX A: TEACHERS' CONSENT

FORM CONSENT FORM

Teachers' Perceptions to Classroom Assessment Practices in Mathematics: A Comparison of

Rural and Urban Schools in England

Michael Jarrett

Liberty University

You are being invited to be in a research study to compare the mean scores on the measures to

determine if there are differences in perceptions and practices between mathematics teachers in

rural secondary schools and mathematics teachers in urban secondary schools in England. You

were selected as possible participant because you have experience teaching mathematics in a

secondary school in England. I ask that you read this form and ask any questions you may have

before agreeing to be in the study.

This study is being conducted by Michael George Jarrett, a doctoral candidate Department of

Education.

Background Information

The purpose of study is to compare the mean scores on the measures to determine if there are

differences in perceptions and practices between mathematics teachers in rural secondary schools

and mathematics teachers in urban secondary schools in England. I am asking for qualified

mathematics teachers with a minimum of two years of teaching experience in a secondary school

in England to participate.

Procedure

If you agree to be in this study, I would ask you to do the following things: Follow the link to the

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online survey, complete the demographic information, and continue to the survey questions. It

should not take more than 15 to 20 minutes to complete the survey.

Risks and benefits:

The risk to participants is considered minimal and no greater than those encountered in everyday

life. There is no benefit for participants of this study.

Compensation:

You will not receive payment for your participation.

Confidentiality:

The records of this study will be kept private. In any sort of report, I might publish, I will not

include any information that will make it possible to identify a subject. Research records will be

stored securely and only the researcher will have access to the records. The results will be

analyzed and reported as either urban schools or rural schools not by teachers.

The data survey results will be kept on a private computer which is password protected and will

be kept at the home of the researcher and the data will be erased and deleted after 5 years.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect

your current or future relations with Liberty University. If you decide to participate, you are free

to not answer any question or withdraw at any time without affecting those relationships.

How to Withdraw from the Study:

If you choose to withdraw from the study, please contact the researcher at the email address/

phone number included in the next paragraph. Should you choose to withdraw, data collected

from you will be destroyed immediately and will not be included in this study.

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Contacts and Questions:

The researcher conducting this study is Michael George Jarrett. You may ask any questions you

have now. If you have questions later, **you are encouraged** to contact him at

███████████████ or at his home at ███████████. You may also contact the

research's faculty advisor, ████████████████████.

If you have any questions or concerns regarding this study and would like to talk to someone

other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971

University Blvd, Carter 134, Lynchburg, VA 24515 or email at ████████████

Please notify the researcher if you would like a copy of this information to keep for your

records.

Statement of Consent:

I have read and understand the above information. I have asked questions and have received

answers. I consent to participate in the study.

Please type your name in this signature box	*Please type the date in this box.*
NAME:	Date:

By continuing to the questionnaire, you have given your consent to participate in the study.

Please click **"Continue"** to complete the survey. Please note that you will not be able to proceed

to the questionnaire unless the signature and date boxes are filled in completely.

APPENDIX B: TEACHERS' EMAIL SCRIPT

Dear Teacher,

As a graduate student in the department of Education at Liberty University, I am conducting research in partial fulfillment for the degree of Doctor of Education. The purpose of my research is to compare the mean scores on the measures to determine if there are differences in perceptions and practices between mathematics teachers in rural secondary schools and mathematics teachers in urban secondary schools in England. The participants in the study will have a minimum of two years teaching experience and are recognized as fully qualified mathematics teachers by the general teaching council of England (GTCE). The participants will range from 20 to 70 years in age.

Your participation in this research would be very much appreciated. The questionnaire will take no more than 15-20 minutes to complete, and your time in completing the survey is deeply appreciated. Your name and other identifying information will be required as part of your participation. To participate, click the enclosed link at the bottom of this page which will take you to the consent form and the survey.

The consent document contains additional information about my research. Please type your name in the signature box, select the date from the drop down menu and submit the consent form electronically before proceeding on to the online survey. Please note that you will not be able to proceed to the questionnaire unless the signature and date boxes on the consent form are filled in completely.

Thanks in advance for your kind support.

Click here to proceed to the consent form and the online survey:

http://goo.gl/forms/0NFDYzch3Q

Sincerely,

Michael George Jarrett

APPENDIX C: EMAIL TO THE AUTHORS OF THE INSTRUMENT

My name is Michael George Jarrett, a doctoral candidate at Liberty University. I am conducting a research as partial fulfillment for the degree of Doctor of Education. The purpose of the study is to compare the differences in perceptions and practices of mathematics teachers in rural secondary schools to mathematics teachers in urban secondary schools in England. The independent variable for the study is defined as locale (urban or rural) secondary school mathematics teachers in England. The dependent variable for the study is defined as teacher's perception and practices to classroom assessment practices in mathematics and will be measured by the Assessment Practices Inventory (API). The study will be comprised of at least 100 participants selected by the random sampling method. The sample will consist of a minimum of 50 urban mathematics teachers and 50 rural mathematics teachers drawn from a population of mathematics teachers from rural and urban secondary schools in England. All the participants in the study will have attained a minimum of two years teaching experience and will be regarded as fully qualified mathematics teachers by the general teaching council of England. I am hereby seeking your permission to use the Assessment Practices Inventory (API) in my study. Should you have any questions or concerns, please feel free to contact me at ▮▮▮▮▮▮▮ ▮▮. My email address is ▮▮▮▮▮▮▮▮▮▮▮ Should you have further questions or concerns, or if your questions or concerns are of a particular nature where you wish to speak to someone other than the researcher, please feel free to contact Liberty University Review Board at ▮▮▮▮▮▮▮ or by mail at Institutional Review Board, 1971 University Blvd. Suite 1837, Lynchburg, VA 24502.

Looking forward to your response.

Thanks in advance for your kind support.

Sincerely,

Michael Jarrett

APPENDIX D: ONLINE SURVEY

Click here to proceed to the online survey: http://goo.gl/forms/0NFDYzch3Q

APPENDIX E: IRB APPROVAL

INSTITUTIONAL REVIEW BOARD

February 22, 2016

Michael George Jarrett
IRB Approval 2421.022216: Teachers' Perceptions to Assessment Practices in
Mathematics: Comparing Rural and Urban Schools in England

Dear Michael,

We are pleased to inform you that your study has been approved by the Liberty IRB. This approval is extended to you for one year from the date provided above with your protocol number. If data collection proceeds past one year, or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. The forms for these cases were attached to your approval email.

Thank you for your cooperation with the IRB, and we wish you well with your research project.

Sincerely,

Liberty University | Training Champions for Christ since 1971

APPENDIX F: EMAIL RESPONSE FROM THE AUTHOR GRANTING

PERMISSION TO USE ASSESSMENT PRACTICES INVENTORY INSTRUMENT

Dear Michael,

Thank you for seeking my permission to use the API for your doctoral research. Please go ahead and use the instrument and give us credit by citing it properly in your research. Just one quick comment: given low response rate often seen in survey research, you may want to aim for a larger n in each group during sampling to ensure having data from enough respondents. This will allow you to run additional subgroup analysis should you choose to do so either for your dissertation or post doctoral research (which is often the case).

Good luck to your dissertation.