

AMERICAN UNIVERSITY OF BEIRUT

INVESTIGATING THE RELATIONSHIP BETWEEN
TEACHER'S MINDSETS (BELIEFS REGARDING
INTELLIGENCE AND ABILITY), THEIR INSTRUCTIONAL
PRACTICES AND STUDENTS' ACHIEVEMENT IN COUNTY
SECONDARY SCHOOLS IN NAIROBI, KENYA

by
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ABSTRACT OF THE THESIS OF

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Title: Investigating the Relationship Between Teacher's Mindsets (Beliefs Regarding Intelligence and Ability), their Instructional Practices and Students' Achievement in County Secondary Schools in Nairobi, Kenya

Educational systems and educators are still searching for new ways to improve student learning and eliminate achievement gaps. Of particular interest are the relationships between teachers' mindsets, instructional practices, and student achievement. While some studies have found empirical links between teachers' implementation of certain instructional practices and student achievement, there are no clear links between teachers' mindsets, instructional practices, and student achievement. This two-phase sequential explanatory study examined whether there is a relationship between teachers' mindsets, instructional practices, and student achievement.

A convenient sample of 211 teachers from various high- and low-performing county schools in Nairobi, Kenya, was purposively selected based on the school's performance criterion as reflected in national standardized tests. Quantitative analysis included structural equation modeling, which was conducted after descriptive statistics were compiled. The analysis revealed a significant relationship between teachers' mindsets and student achievement, no significant relationship between teachers' mindsets and their instructional practices, and a positive, non-significant relationship between teachers' instructional practices and student achievement.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	1
ABSTRACT	2
ILLUSTRATIONS	7
TABLES	8
ABBREVIATIONS	9
INTRODUCTION	10
Background Information.....	10
Statement of the Problem.....	14
Rationale	18
Statement of Purpose	19
Research Questions.....	19
Operational Definitions.....	20
LITERATURE REVIEW	23
Introduction.....	23
The Education Sector in Kenya	23
Primary School Education.....	24
Secondary School Education.....	24
University and College Education.....	25
Tackling the Educational Challenges in the Kenyan Context	25

The Theory Behind Mindsets	28
Teachers' Mindsets and Why They Matter, and Can They Be Changed?	30
Actualization of Teachers' Mindsets in Practice.....	31
Teacher's Mindsets and Their Instructional Practices	35
Instructional Practices Associated with Teachers' Growth or Fixed Mindsets....	36
Teachers' Mindsets and Student' Achievement	39
Teachers' Mindsets in Closing Achievement Gaps	41
Pedagogical Considerations in Competency-Based Education	42
Initial Conceptual Understanding	42
METHODOLOGY	46
Introduction.....	46
Research Paradigm	46
Research Design	46
Rationale for the Mixed-Method Design.....	47
The Methodology: Two-Phase Sequential Explanatory Research Design.....	48
Sequential Explanatory Mixed-methods Design Steps.....	50
The Quantitative Strand	50
Participants and Sampling	51
Data Collection.....	51
Response Rate	52
Instruments for Data Collection	52
Data Analysis	54
Descriptive Statistics	54
Structural Equation Modeling	55
Qualitative Strand	58
Participant Selection.....	58
Data Collection.....	58

Data Analysis	59
Integration of Quantitative and Qualitative Data.....	59
Quality Criteria	60
Ethical Considerations	62
Limitations of the Study	62
RESULTS	64
Introduction.....	64
Quantitative Strand Findings	64
Demographic Information on the Study Participants	64
Teachers’ Mindsets, Instructional Practices, and Student Achievement.....	66
Determination of Teacher’s Mindsets	66
Relations Between Teachers’ Mindsets, Instructional Practices, and Students’ Achievement.....	67
Structural Model.....	75
Qualitative Strand Findings	76
Introduction	76
Teachers’ Mindsets	77
Teachers' Mindsets and Practices	81
DISCUSSIONS, CONCLUSIONS, RECOMMENDATIONS ...	86
Introduction.....	86
Discussion.....	88
What Are The Teachers’ Mindsets?.....	88
The Relationship Between Teachers’ Mindsets Instructional Practices and Student Achievement	889

Conclusion	93
Recommendations.....	94
APPENDIX A... ..	95
APPENDIX B.....	97
APPEDIX C.....	98
REFERENCES	101

ILLUSTRATIONS

Figure

1. A Schematic Presentation of the Conceptual Framework	45
2. Gender.....	65
3. Years of Experience.....	65
4. Area of Teaching	66
5. QQ Plots Findings Representation.....	68
6. QQ Plots Findings Representation.....	69
7. Measurement Model Representation	73
8. Structural Model Representation	75

TABLES

Table

1. Sequential Explanatory Mixed-methods Design Steps	50
2. Overall Mindset Score.....	67
3. Henze-Zirkler Test	69
4. Factor Loadings.....	70
5. Cronbach's Alpha for the 'new_data1.....	72
6. Holzinger Swineford CFA.....	74
7. Holzinger Swineford CFA.....	76

ABBREVIATIONS

CBC	Competency-based Curriculum
IPS	Instructional Practices Survey
IP	Interview Protocol
IRB	Institute Research Board
KCPE	Kenya Certificate of Primary Education
KCSE	Kenya Certificate of Secondary Education
KNEC	Kenya National Examination Council
MOEST	Ministry of Education Science and Technology
MSI	Mindset Survey Instrument
RoK	Republic of Kenya

CHAPTER 1

INTRODUCTION

Background information

The terms equality and equity are quite prevalent in education and are often used interchangeably despite having important distinctions. These concepts carry implicit expectations concerning what is fair, including suggestions regarding how people should be treated and how resources should be disseminated in a given context (Levitan, 2015). Just as it sounds, equality connotes a state of being equal or what is fair for the group, focusing on providing access to the same opportunities to everyone despite specific needs. While fair resource allocation is a necessary goal, equality is inadequate to realize equitable opportunities and outcomes for all learners and unfeasible to a great extent for several reasons. For one, education systems and schools are naturally unequal spaces if we consider the students' needs and familial backgrounds, teachers' training and experiences, the curriculum resources, and even the geographical locations of schools.

On the other hand, Equity seeks to recognize the distinct needs of individuals within a group, with an emphasis on what is fair to each individual. Universal access to high-quality educational opportunities, justice, inclusion, and eliminating discriminatory behaviors and bias within the educational system are all common elements among definitions of equity (The Aspen Education & Society Program and the Council of Chief State School Officers, 2017; NSBA, 2019). Equity, thus, seems to be more commendable because of its sensitivity to differences among learners and, also, a more powerful starting point or strategy and goal in education as it strives beyond the closing of academic achievement gaps with a vision for a world where all learners thrive.

To attain equity within the education systems Sturgis & Casey, (2018a) posits that action at three levels of change is required. These levels pertain: systemically, organizationally, and individually. This also comes with the requirement of dismantling institutional practices that reproduce or perpetuate inequity. Thus, to realize equity at school and classroom levels, practitioners are encouraged to focus on rooting out old practices and beliefs that reinforce inequitable outcomes. Knowing that inequity begins with individuals' beliefs (Kate Gerson, 2018), creating an equitable future requires adults involved to be responsible in uncovering, unpacking, and addressing the biases that they carry, consciously and unconsciously, and how this influences how they operate through informed reflections. Besides, understanding the roots of unconscious biases and the channels through which unconscious biases influence outcomes such as academic performance, can help guide the development of interventions aimed at reducing the inequities and inequalities that such biases perpetuate (Gershenson, 2017). Such an approach, therefore, puts individual's belief systems, the related beliefs and the practices that accrue from the beliefs on the spot.

Relating to the current study, thus, two key assumptions here are that teachers' beliefs are vital in addressing inequities through the role they play in learning and teaching, and teachers' have an upper hand in influencing simultaneously students and the whole educational context and so is their beliefs. These assumptions are partly supported by literature positing that of all factors influencing student learning and achievement (student, home, school, teacher and curricular teaching) teacher as a factor has the highest impact on students learning (Donohoo, Hattie, & Eells, 2018; Hattie & Zierer, 2017). Additionally, instructors' planning, instructional decisions, and classroom practices, as well as student achievement hugely depends on their educational beliefs.

Understanding the belief's conceptualization and how beliefs interact or might influence teachers' decisions, the practices they enact based on those beliefs and the possible outcomes that might accrue from such an interaction is essential. The conceptualization of beliefs has a lengthy history, and many authors have described it in different ways using different terminologies (e.g., Ertmer 2005; Hermans, Braak & Keer 2008) resulting in confusion in its conceptualization. This myriad ways of defining teachers' beliefs in the literature has consequently led to the difficulty in describing teachers' beliefs in unequivocal terms. It's no wonder, then, that Pajares, (1992) described teacher beliefs as a "messy construct", claiming that definitional issues, weak conceptualizations, and diverse understandings of beliefs and belief systems are to blame for the difficulty in analyzing teachers' beliefs (p. 307).

Nevertheless, a definition often used extensively in the literature to conceptualize belief is one presented by Richardson (2003). Richardson posits that beliefs are psychological understandings, premises, or assertions that are felt to be true. As a result, beliefs can be thought of as estimates of the probability that one's understanding of a proposition or subjective experience is correct.

Furthermore, because beliefs are grouped together as a group of interrelated beliefs in a larger, more general belief structure or system, their strength can vary. The more interconnected a belief is with others in this system, the more difficult it is to change it (Pajares, 1992). As the focus of this study is on teacher beliefs, a question about the link between teachers' beliefs, attitudes, and knowledge is frequently posed. With reference to the attitude a contrast is drawn between an affective, a cognitive, and a conative component (behavioral or action part). Currently, beliefs are regarded as the cognitive component of attitudes. The distinction between beliefs and knowledge is

increasingly becoming apparent. A popular distinction is that beliefs are founded on subjective probability (judgments and evaluations), whereas knowledge refers to objectively verified facts.

Also, since beliefs reside in an individual's mind, it can be challenging to explore their nature, their influence on practice and equally the consequences made by such beliefs in practice. However, since beliefs according to Rokeach, (1968) have a cognitive component (knowledge) that is linked to an affective component (able to elicit emotion) and a behavioral component (active when action is necessary), it is argued that beliefs cannot be observed or assessed directly, but should be deduced from what people say, intend, and do (Parajes,1992 p. 314).

Beliefs form a critical part of the learning and teaching experience. In fact, earlier research on beliefs consistently points towards beliefs as the one of the most critical parts in education (Nespor, 1987; Pajares, 1992) and thus beliefs should be the focus of education research since they can inform the teaching practice in ways other research agendas have not and cannot (Pajares, 1992). Moreover, it is posited that a teacher's beliefs and practices are vital in supporting students to consider their own beliefs in developing thinking strategies that support their learning. According to Hattie (2012), visible learning is noteworthy here. In a meta-analysis, he discovered that a number of classroom practices have a significant impact on student learning. Students are more likely to achieve higher levels of accomplishment, according to Hattie, when teaching and learning are apparent, and metacognition is explicit. In support of this, teachers must assist and scaffold students to become their own teachers by seeing learning through their students' eyes. Thus, teachers' beliefs, in essence, have the greatest influence on student growth and may be the most potent influencers (Hattie, 2012). Consequently, teachers'

various beliefs, or assumptions, about themselves and their students have a significant impact on their expectations, teaching methods, and even how students perceive their own mindset.

Considering the above, it is apparent that beliefs are key to any effort of meeting students' needs and can be central in providing equitable learning experiences. These claims are supported by a substantial body of evidence demonstrating a close relationship between instructors' beliefs, planning, instructional decisions, and practices (Rissanen, Kuusisto, Hanhimaki, & Tirri, 2018a, b; Ronkainen, Kuusisto, & Tirri, 2018). This evidence, also solidifies beliefs as having an undeniable power or role and thus, examining teacher beliefs provides a better understanding of the relations between beliefs and student outcomes, and insights into teachers' classroom practices and pedagogy (Kagan, 1992; Muis & Foy, 2010). Teachers can utilize these insights to reflect on their own beliefs and practices, which is crucial in eliminating educational inequity (Sturgis & Casey, 2018a).

Noteworthy, teachers' beliefs can vary greatly, even among teachers within the same educational setting or school. One area in which differences in these beliefs could potentially have far-reaching effects has to do with beliefs relating to the malleability of human attributes (e.g., intelligence; Howard-Jones, 2014) often termed as teachers' mindsets (Dweck 2000). Beliefs are held both by students and teachers. Research is also increasingly pointing towards teacher mindsets as a critical component for student learning and achievement and more specifically for learners facing challenges and difficulties (Blackwell, Trzesniewski & Dweck, 2007; Dweck, 2008; Mary Cay Ricci, 2013).

Statement of the Problem

Current reforms in Kenya, particularly the implementation of a competence-based curriculum is being hailed as the ultimate solution to some of the difficulties associated with poor-quality learning, disparities in student achievement, and poor student outcomes under the 8.4.4 system. Experts believe it will allow students to grow beyond academics and focus on how they may best use their unique talents to earn a living and flourish in a competitive global world (Chemagosi, 2020). On the face this seems to be a plausible undertaking, but a few things stand in the way of realizing the promise of this reform. Such obstacles lie within the structure of the traditional education system, which is strongly imbedded in inequity coupled with huge students' achievement gaps. Particularly, these obstacles and achievement gaps are more pronounced at the secondary level education than the primary school levels (Gituro, 2011).

Kenya's high school education is structured in a way that it sorts students and hugely benefits those learners from middle- and upper-income households. To illustrate, within the public high school's education system a tripartite hierarchy of the schools exists. The schools are highly stratified into an almost cast like system where at the peak of the hierarchy there is a national school, followed by a provincial school in the middle tier (currently termed as extra-county schools), and a district school (county and sub-county school) forming the lowest cadre of secondary school level at the base. Students are either tracked into national schools, provincial schools, or district schools based on their performance at the national exit exam at the end of the primary school cycle. Of these learners transitioning from the primary schools to secondary schools 70 % of them are enrolled in district schools. The performance and achievement gaps among these different levels of secondary schools keeps widening and learner wastage at this level of education remains quite high (Muchunguh, David, and Faith Nyamai, 2021)

To illustrate, on average, in the low-rank schools (district school), the average national exam performance at the end of the cycle is C- to D+ compared to the A to A- average for national schools and B+ to B- average for the provincial schools. In general, learners at the district schools experience less achievement growth than their counterparts in the other schools. Further, according to the ministry of education, science, and technology Kenya (MOEST), in 2011, for example, at the secondary national exam, 357,488 candidates sat for the exam, and only 27 percent obtained a mean of C+ and above, which is considered the minimum university entry benchmark. Different report and studies also indicate that approximately 88.5 percent of students do not make the cut for Higher learning (KIPPRA, 2018). In 2008, for instance, just 25% of students received a C+ or higher on the Kenya Certificate of Secondary Education (KCSE) to qualify for higher learning. District schools performed the worst, with just 11 percent of students receiving a C+ or higher, compared to 43 percent in Provincial schools and 90 percent in National schools. More recent results still reflect a persistent trend in this poor performance i.e., just 15.6 percent in 2016 qualified for university, 11.5 % in 2017 and 65% scored a 'D' plus and below 2016 and 2017 (RoK, 2018). An economic survey released in 2021 also indicates that a cohort of 2016 that sat for K.C.P.E 204,690 candidates who transitioned to high school did not manage to sit for their Kenya Certificate of Secondary Education let alone transitioning to university (Muchunguh, David, and Faith Nyamai, 2021).

Even though the statistics on the trajectory patterns of learners in the various public secondary schools into higher learning are not well documented, a glimpse at the trends of performance at the end of secondary shows that a vast majority of learners from district schools do not make the cut to transition to universities (Amadalo, Maiyo &

Amunga, 2009). Their counterparts from national or provincial schools proceed to universities and can secure government student loans if accepted at the public universities. For those able to afford, they join private universities or public universities but as self-sponsored students. These students continue to have better qualifications that substantially increase their chances of securing a relatively well-paying job. For district-level students, a vast majority of them get absorbed into technical colleges which are not government-funded. For this reason, most learners do not continue past secondary education since many of them are from low SES.

Why is the performance and students' outcomes from district schools so low compared to the other levels? Probable explanation could be drawn from the existing literature on teacher effectiveness and student achievement, which is rich with many of its facets widely covered. Particularly, when it comes to the low achievement of students and the relation to teacher instruction as seen in the research work of John Hattie over the years (Hattie 2003, 2012, 2015; Marsh & Hattie, 2002) it is easy to deduce that the teacher and the teaching quality, the expectations the teacher holds for his/her learners coupled with his/her perceptions of their efficacy can affect the quality of their instruction and subsequently have a significant impact on the learner's achievement.

A wealth of research on teachers and learner achievement from other researchers also supports the view that teachers treat their students differently depending on notions or expectations they have formed (Denessen, Keller, Bergh & Broek, 2020; Kaplan & Owings 2013). Teachers' thoughts and beliefs influence student academic performance and outcomes and perceptions of their abilities, and they tend to believe in themselves when their teachers believe in them. In fact, researchers found that prior achievement, test scores, anecdotal information from other teachers, current grades, socioeconomic status,

or appearance can drive these expectations and that teacher expectations reflect on their behaviors, which eventually influences students' success (Lynn, Bacon, Totten, Bridges & Jennings, 2010). Specifically, these erroneous teachers' expectation is likely to affect those learners from low SES which would lead to poor performance and achievement for such students. A key contributing factor in achievement gaps and inequities in schools.

Rationale

Research on beliefs has been persistent in the educational settings and even though most of this research has been more on student cognitions, and how they influence the student's ability to solve problems and make decisions, a shift to focus more onto teachers' beliefs, their planning and decision making is currently being emphasized (Fives & Buehl, 2010). This is because teachers are practitioners situated in an uncertain complex environment in which they have to make decisions and plan with a great reliance on their belief systems. Therefore, research on instructors' implicit beliefs and related meaning systems is required in general. Because instructors must constantly code large amounts of social data, and implicit theories have been shown to have a significant impact on how people find meaning in their own and others' social actions, it is critical to consider how teachers' implicit theories influence their meaning making in the classroom, as well as how these theories influence teachers' pedagogical thinking and practices (Rissanen, Kuusisto, Hanhimäki, and Tirri 2018). Also, previous research on implicit beliefs and mindsets has been focused on investigating broad patterns using quantitative and experimental research methods designs (Burnette, O'Boyle, VanEpps, Pollack, & Finker, 2013; Dweck, 2000). The findings of these studies are sometimes vague, and further research is needed to understand how individuals' implicit conceptions become actualized

in natural contexts and vary depending on the situation (Rissanen, Kuusisto, Hanhimäki, and Tirri 2018).

Furthermore, research on the impact of mindset on pedagogical practice is beginning to emerge and gain traction (Rattan et al., 2012), but there is still a scarcity of research that goes beyond the relationship between teacher mindset and instructional practices and student achievement. In fact, more research studies are recognizing this gap and urging greater research into how teacher's mindset informs their practice and the consequences on student achievement in different contexts and education levels (Rissanen et al., 2018a, Rissanen et al., 2018b; Ronkainen et al., 2018; Gutshall, 2013). These were the driving forces for the current study, which used a mixed methods approach to investigate whether there was a relationship between teachers' mindsets, instructional practices, and student achievement as a point of departure.

Statement of Purpose

This study's intent was to examine the relationship between teachers' mindsets and the instructional approaches they adopt in classroom and how this reflects in student outcomes (achievement). A two-phase sequential explanatory mixed methods was utilized in this study. In the first part, quantitative research was used to address the relationship between teachers' mindsets in relation to the instructional approaches they might adopt in classroom and how this reflects on students' achievement (standardized tests). Thereafter semi- structured interviews were conducted to explore how the teachers described the role their mindsets played when making plans and decision on the instructional approaches to use in the classrooms.

Research Questions

At the core of this study are the research questions outlined below.

1. What are the Nairobi-county schools teachers' mindsets? And is there a relationship between teachers' mindsets instructional practices and students' achievement?
2. How do teachers explain/ rationalize their mindsets with regard to their view of their student's ability or intelligence as reflected in and connected to their self-reported instructional practices?

Operational Definitions

Fundamental to this study was the exploration of relationships among teachers' mindsets, instructional practices and student achievement, thus conceptualizing and examining these terms as well as some key ideas that underpin these terms was essential for the study. The definitions were derived from the existing literature and are adopted as stated below.

Mindset

Literature differs in the labelling of mindsets. Terms such as implicit theories, mindset, incremental theory, and malleable intelligence are all used interchangeably. All these terms however pertain to the view individuals hold regarding basic human qualities and that intelligence can be developed (Dweck, 2000, 2008).

A growth mindset

Refers to the belief that intelligence and academic ability are malleable and can be improved through effort and learning. A growth mindset individual endorses a viewpoint that intelligence, personality, and abilities can be developed (Dweck, 2008).

A fixed mindset

The belief that intelligence and academic ability are fixed qualities that students either have or do not have and cannot be changed with effort. It is also known as a "entity"

theory of intelligence. Those who hold a fixed mindset consider these basic human qualities fixed and unchangeable (Dweck, 2008).

Latent variables

Latent variables are explanatory entities or hypothetical constructions that are assumed to indicate a continuum that is not directly observable. The concept of intelligence is a good example. There is no one-size-fits-all metric for determining intelligence. Instead, researchers examine components of intelligence using many sorts of observed factors, such as verbal reasoning tests or memory capacity (Kaplan, 2009)

Exogenous/Endogenous variables

According to Kaplan, 2009 in structural equation modeling, endogenous variables refer to outcome (dependent) variables. Endogenous means "from within," and every endogenous variable has at least one source, commonly depicted on a model's diagram's left side. Independent variables are known as exogenous variables in structural equation modeling (SEM).

Instructional practices

Instruction refers to anything that is done purposely to facilitate learning. Instructional practices are techniques that teachers use to help students become independent and strategic learners. According to Reigeluth & Carr-Chellman, (2009) It is also vital to note that instructional practices may differ in different educational spaces and among teachers depending on the goal of students' outcomes. For example, a context where learning is seen as the acquisition of knowledge is likely to have a different set of instructional practices adopted compared to a context where learning is seen as the production of knowledge within a community. Thus, the context was a key consideration to inform the conceptualization of the instructional practices in this study.

Student achievement

Student achievement is defined either narrowly or broadly in the literature on achievement measurement and factors that affect student achievement (see, for example, Hattie & Anderman, 2013). When defined narrowly, student achievement refers to 'hard' abilities and knowledge that are quantified by standardized tests; this is also described as academic achievement (Haines & Mueller, 2013). Student achievement, according to this concept, is linked to the student's ability to reproduce knowledge and tasks. Most student achievement research adheres to this restrictive definition, and grades are used as a standardized measure of student achievement. In this study, student achievement utilizes the narrow definition by (Haines & Mueller, 2013) and thus is based on standardized test grades which is still the form of student academic achievement measure in use in this study's context at the secondary school levels

Based on the above, this study arguably hypothesizes that teachers influence the critical aspects of schooling (teaching and student learning) and are best placed in effecting systemic change within education settings. This change however can only be fully realized if teachers are aware of their beliefs/mindsets, and how they influence their practices affecting student learning process and achievement. This study therefore delves into teachers' mindsets, the relationship among these mindsets and the instructional practices teachers adopts and how this relationship reflects on students' achievement. An understanding of how this relationship plays out will thus offer insights for teachers to reflect upon their practice, make necessary improvement or changes that could be a step closer towards equity and better student outcomes within the education systems.

CHAPTER 2

LITERATURE REVIEW

The chapter reviews education in Kenya, Primary School Education, Secondary School Education including University and College Education. It further highlighting and reviews how educational challenges are tackled in the Kenyan context.

The chapter also discusses literature on the relationship between teachers' mindsets, instructional practices and student achievement. The literature review covers topics on the theory behind the mindsets, teachers' mindsets, why they matter, and whether they can be changed, actualization of teachers' mindsets in practice, teacher's mindsets in relation to instructional practices, instructional practices associated with teachers' growth or fixed mindsets, teachers' mindsets and student achievement, role of teachers' mindsets in closing achievement gaps.

The Education Sector in Kenya

The education scene in Kenya is unfortunately characterized by a plethora of problems coupled with plausible progress over several years. Some of these problems partly stem from the fact that education in Kenya was not developed with designed and tested objectives in mind but just grew (Court and Ghai, 1974). For instance, during the era of colonialism in Kenya, there was no concept of a nation but rather, numerous nations coexisting on the same land, according to the head of Kenya's first educational commission (Ominde, 1964).

Accordingly, education was divided along racial lines all distinctly separated by rigid boundaries just like the society. For example, there was an 'African education,' a 'European education,' and an 'Asian education'. African education, particularly, tended to

be a hybrid, straddling the line between a European model with a subject matter and an education deemed appropriate to colonial society "proper" to the African people (Ominde, 1964).

Just immediately after independence, however, significant educational reform were implemented. These changes would begin with a formation of a single educational system, no longer stratified along racial lines, to coincide with the creation of a single nation. Subsequently 7-4-2-3 education system was implemented and would run between 1964 up to around 1985. This education system consisted of seven years of primary school, four years of lower secondary (forms 1 – 4), two years of upper secondary (forms 5-6), and three years of university. This structure however excludes 'pre-primary' education, which is provided to children under the age of six. As from January 1985, the 8.4.4 system was introduced. This system places a high emphasis on mental and skill preparation for the workplace, particularly self-employment. In addition to the pre-school years, the 8-4-4 system is separated into primary, secondary, and university levels. The structure is described briefly below.

Primary School Education

Education at this level starts at the age of six and comprises eight years of schooling. In the first three years instruction maybe in mother tongue but the medium of instruction from the 4th grade to the 8th grade is invariably in English. Most primary level schools are public schools, but over the years the number of private primary schools has steadily increased (Zuilkowski, Piper, Ong'ele, & Kiminza, 2018).

Secondary School Education

Secondary school comprises of four years. While majority of schools at the secondary schools are public there is quite a significant number of private schools at this

level. The public schools are partially funded by the government while the private schools are self-funded.

University and College Education

Since the founding of the University of Nairobi, Kenya's first public university, in 1970, more than 30 general public institutions and an estimated 30 chartered private universities have been created, the majority of which are run by religious organizations.

Despite the fact that the 8-4-4 system has been changed to be more accommodative and has served the Kenyan education for over three decades, Kenya once again has reformed its education system and curriculum from pre-school all the way through to high school (Akala, 2021). These changes consist of a competency -based curriculum under a 2-6-6-3 structure with three levels of education: Early years, Middle school and Senior school, 2 years (pre-primary), 6 years (middle school), 6 years (in lower secondary and senior school) and the 3 years (minimum) of college education. As of 2021 the new curriculum has been implemented up to 5th grade with the rest of the grades still using the old curriculum under the 8.4.4 system which is slowly being phased out.

Tackling the Educational Challenges in the Kenyan Context

At the backdrop of the enthusiasm of the current reforms (competence-based curriculum) and restructuring of the education system lies a real risk. These changes seem promising. Many schools and education systems have recently adopted competency-based education for a variety of reasons, including developing globally competitive graduates, designing schools that promote what is best to help students learn, achieving greater equity, creating a system of continuous improvement and learning, and fostering deeper learning (Sturgis & Casey, 2018). However, if adequate interventions are not put

in place, the promise of this competency-based curriculum (CBC) reform may not be fulfilled or benefit learners equitably in the way it is intended to, especially in the Kenyan education system. Already the concerns whether the teachers are ready to successfully align their practices to the new curriculum have been raised.

On one side the Ministry of education insists that teachers are well prepared (Gamonde, 2019), on the other side research reports (Momanyi & Rop, 2020; Ondimu 2018) point out that the teachers are not well placed to implement and operate sufficiently under this new system and curriculum (Momanyi & Rop 2020) sentiments that have been vehemently echoed by Kenya National Union of Teachers (Knut) and Kenya Union of Post Primary Education Teachers (Kuppet) (Munyao, 2020).

Competence-based approaches to teaching and learning are intended to provide students with opportunities to practice their learning and actively reflect on it in a socially placed setting in order to improve their knowledge, skills, and understanding. As a result, learning becomes a personal and engaged experience. The teacher's function in a CBC class is thus that of a facilitator, coach, or pedagogical expert rather than a knowledge transmitter. Teachers, on the other hand, have less control over the learning process in the more learner-centered, flexible setting of CBC courses, and they may have difficulties reconciling teaching and learning practices that are synergistic with these purposes and their perceived role (Ketelaar, Beijaard, Boshuizen & Brok, 2012). Teachers may act to support or protect their existing identity, beliefs, and practices if they are unable to make sense of the duality of those roles. As a result, a vital step in resolving all of these issues while effectively integrating the new curriculum is to make individual changes, including changes in instructors' mindsets, erroneous expectations and instructional styles.

Furthermore, a competency-based curriculum is oriented towards a growth mindset, mastery learning and building educators capacity with a centrality on the learning process. It also built upon a constructivist approach where learners are guided to solve problems. According to Kouwenhoven (2003) the role of the teacher in a competency-based education is that of a cognitive guide. Considering this, we can arguably say that a major success of such an education system heavily relies on the alignment of growth mindsets and appropriate instructional approaches that encourages mastery learning (Kafyulilo, Rugambuka & Moses, 2013). Thus, if this alignment is insufficient/lacks in an education system, there is a need for interventions directed towards the teachers and students as they are the key players in education learning and teaching. A starting point as reflected in this study is to learn about teachers' mindsets, the relationship among these mindsets and the instructional practices they adopt and how this reflects in student's achievement to enable insights that could be utilized to tailor intervention programs that are fit for this context.

Further understanding of the relationship between teachers' mindsets, instructional practices they adopt based on these mindsets, and student achievement is critical to harness the promise of the benefits associated with the teachers' mindsets in classrooms and enhance equity, quality teaching and effective learning in this context. Besides factoring the context specific challenges outlined earlier, it is crucial to understand teacher mindsets and concurrent teaching practices to support curricula and interventions intended to promote students' learning in face of challenges, subsequently, academic achievement.

Moreover research on mindset suggests that teachers holding an entity theory of intelligence (fixed mindset) have lower expectations for the achievement of struggling

students than those teachers holding an incremental theory of intelligence (growth mindset), therefore, a critical factor in ensuring equity and quality learning and teaching is creating awareness of teachers' mindsets, how they inform their teaching practices and how this relationship impacts on students' day to day learning and achievement (Rattan, Good, & Dweck, 2012; Beilock, Gunderson, Ramirez, & Levine, 2010). Without this awareness, teachers could be creating unintended drawbacks for students because of their own expectations of students, or their instructional practices could also be counter intuitive to their growth mindsets. Further, understanding and knowing their own mindset and how it influences their own teaching practices and consequently impacting student achievement, teachers will be able to engage in self-reflection, supportive dialogues with school management, and seek growth mindset training or interventions for teachers themselves which would lead to improved quality teaching and learning. If teachers' mindsets are not known, they cannot be developed to alleviate barriers to student success.

The Theory Behind Mindsets

Mindset theory comes from two motivational research traditions: attribution theory and achievement goal theory (Dweck & Leggett, 1988; Dweck, 2000). People's explanations for success or failure (their attributions), according to attribution theory, is likely to form their reactions to a situation, with attributions of failure to an ineptitude leading to less consistent responses to setbacks than attributions to more easily controllable factors, such as strategy or effort (Weiner & Kukla, 1970; Weiner, 1985). According to Diener and Dweck (1978) and Dweck and Reppucci (1973), students of similar ability can vary in their inclination of exhibiting these different attributions and responses. Later, achievement goal theory was developed to explain why students of relatively similar ability could react differently to a failure situation (Elliott & Dweck,

1988). In comparison to students who have the goal of improving their abilities, students who have the goal of validating their competence or avoiding appearing incompetent (a performance goal) seem to display more helpless responses in terms of (ability-focused) attributions and conduct (a learning goal) (Elliott & Dweck, 1988; Grant & Dweck, 2003).

Moreover, according to this theory of mindset, situational attributions and goals are not isolated concepts but are cultivated by more situation-general mindsets (Molden & Dweck, 2006). Because of the various goals and attributions in the circumstances involving problems and failures, these more situation-general mindset assumptions about intelligence, whether fixed or not fixed, can be developed and contribute to discrepancies in achievement (e.g., grades and test scores). In short, mindset theory is a theory of how people react to difficulties or setbacks. It is not a general theory of academic achievement, and it does not claim to explain the majority of the variation in grades or test scores. According to the theory, mindsets should be linked to success, particularly among people facing difficulties.

In Dweck's early studies (Dweck & Bush, 1976; Dweck et al., 1978) on the attribution of failure feedback, the term "implicit theory of intelligence" may be regarded as the foundation for the idea of "mindset" (Dweck & Leggett, 1988; Levy & Dweck, 1999; Dweck, 2000). People's implicit theories influenced their self-judgment and played an important role in their adaptive or maladaptive functioning, as well as how they judged and handled others, according to Dweck's (2000) analysis of results based on her 30 years of study. Later studies by Dweck (2012) found that a growth mindset can "advance dispute resolution between longtime rivals, decrease even chronic hostility, promote cross-race ties, and enhance willpower" (p. 614). Burnette, O'Boyle, VanEpps, Pollack, and Finkel (2013) demonstrated that implicit theories predicted self-regulatory

mechanism, which in turn predicted target achievement, by incorporating the SOMA (setting/operating/monitoring/achievement) model into a quantitative synthesis of research collected from 1988 to 2010. Goal setting, goal operating, and goal tracking, in particular, showed a potential to connect incremental beliefs to goal achievement. Researchers became more interested in mindsets and intensified research in this area from these earlier studies. Noteworthy, while the term "implicit theory of intelligence" has been used in most of these earlier studies, presently, researchers use the term "mindset," i.e. (Esparza, Shumow, & Schmidt, 2014; Gutshall et al., 2014). The meanings of "implicit theory of intelligence/ability" and "mindset" tend to be very similar in current academic research. For simplicity and cohesiveness, the word "mindset" will be used in this study.

Teachers' Mindsets and Why They Matter, and Can They Be Changed?

Mindsets matter in learning and teaching in general because students interpret their surroundings through the lens of their beliefs and perceptions. Students' beliefs are molded by their experiences and the subtleties they receive from those around them, such as parents, teachers, coaches, mentors, and peers. Given the central role that teachers play in student learning, it is proposed that teachers' beliefs or mindsets have the greatest influence on student achievement and may exert the greatest influence (Hattie, 2012). Also, relating to ecological theory, the way in which an individual views their intelligence can influence and be influenced by several systems within the environment (Bronfenbrenner, 1979). Thus, an individual's ecological system will intertwine with another's ecological system. It can be argued that the interactions of the microsystem may have the most effect, that is, interactions between teacher and student (O'Kane, 2007). This is complex; not only does a teacher's perception of a student's ability reinforce the student's view of themselves, but also a teacher's self-view impacts their approach and

confidence levels. Additionally, students take cues from environmental messaging, teacher feedback, and their own concerns and encouragement in an educational setting. That messaging determine which objectives are important and what actions students should take to achieve those objectives (Dweck, 2006; Yeager & Walton, 2011). Mindsets combine goals, beliefs, and behaviors to shape students' thoughts and actions (Dweck & Yeager, 2019). This integration occurs on a daily basis in classrooms around the world, in all cultural contexts. Thus, in consideration of the above, teachers' mindsets or assumptions about themselves and their students matter and must be considered when designing an intervention or seeking sustained change

On the other hand, evidence shows that teachers' mindsets can be altered just like those of the students they teach (Gerstein, 2014). One approach may be to support teachers in developing growth mindset practices in their teaching, gaining knowledge and confidence towards implicit theories, and providing opportunities to experience cognitive dissonance to support a sustained change to their practice. Cognitive dissonance is when an individual is presented with a concept contrary to their core belief (Festinger, 1957): discomfort is often experienced when two contradictory beliefs are held. It is suggested that an individual will seek resolution when in dissonance, resulting in mindset change, either affirming their initial belief or shifting to a new belief. Previous research has also found individuals can develop new cognitions which challenge and change deeper schema held by them (Martin, 2015).

Actualization of Teachers' Mindsets in Practice

Within the classroom setting, interesting findings of teachers' mindsets have been documented in the literature. Some of these findings concern teachers' mindsets and how they manifest in their practice. Bryan (2012) concluded that science instructors' beliefs

are likely to impact their students' mindset beliefs through the teaching strategies they use and the quality of their interactions with students in a study of science teachers' beliefs. Also, teachers who had been encouraged to believe in a growth mindset in mathematics were more likely to encourage failing students to try harder and offer particular learning practices that would help learners improve according to Good, Rattan and Dweck (2007, cited in Dweck, 2008). Teachers who had been taught to think in a fixed mindset, on the other hand, tended to console students who had failed by informing them that some students are good at math while others are not, encouraging a fixed mindset.

Furthermore, teachers with a growth mindset may communicate how mistakes in their classroom are learning opportunities rather than indicators of low ability and support this viewpoint with assignments and evaluations that encourage students to keep improving (Canning, Muenks, Green, & Murphy, 2019; Muenks, Canning, LaCosse, Green, Zirkel, Garcia & Murphy, 2020). This might motivate a student to keep acting on their growth mindsets. Teachers who have a more fixed perspective, on the other hand, may use techniques that make a developing growth mindset meaningless and locally ineffective. They can imply, for example, that only a few pupils have the ability to obtain an A or that not everyone is "a math person" (Rattan, Good, & Dweck, 2012; Muenks et.al., 2020). These messages may lead children to believe that if they had to work hard or asked a question that exposed their uncertainty, their intelligence would be negatively assessed, deterring them from engaging in crucial growth mindset actions.

Additionally, several studies have shown that teachers who have a fixed mindset are likely to lead into potentially problematic teaching practices such as comforting students for their presumed lack of ability. When comparing undergraduate teachers who espoused a fixed mindset approach to teaching math to teachers who endorsed a growth

mindset approach to learning, Rattan, Good, and Dweck (2012) discovered that teachers who endorsed a fixed mindset approach to teaching math judged their struggling students as having low ability. Also, multiple studies by Rattan, Good, and Dweck (2011) indicates how teachers with differing mindset interact and react to learners. For instance, in the first study of these multiple studies by Rattan et.al (2011) forty-one, racially diverse, undergraduate students from a private university completed an online survey, which determined whether they endorsed an entity or incremental mindset. The study participants were asked to imagine themselves as a seventh-grade math teacher meeting with pupils one-on-one to discuss their first math exam score of the year. Jennifer, the first student, scored a 65 percent. Two questions were then posed to the participants:

- 1) Do you think she got a 65 percent on the test because she isn't good in math?
- 2) What percentage of her grade is due to her lack of effort and what percentage is due to her lack of mathematical intelligence? (sum=100%).

The results showed that, as predicted, the more participants exhibited an entity theory, the more they agreed that Jennifer's poor math score was attributable to her lack of intelligence rather than her lack of effort. About 42% of those who supported an entity theory thought it was due to a lack of math intelligence, whereas 30.7 percent of those who supported an incremental theory thought it was owing to a lack of effort in math (Rattan, Good, & Dweck, 2011).

Rattan, Good, and Dweck (2011) then conducted a second study to see if an entity theory leads to potentially problematic instructional approaches including consoling learners for their perceived lack of ability. On the East coast, 95 college students were invited to read an article that manipulated with implicit beliefs of math intelligence (entity theory condition and incremental theory condition). Expert advice included in the

articles stated that math intelligence was either 88 percent fixed or 88 percent flexible. Following that, participants read the scenario from research one, but the gender was switched (Jennifer/Jason), based on math stereotypes. The index examined how much they would prefer to console learners because of their inadequate ability (reliability was satisfactory at 0.61). The items reflected consoled the student for her/his poor performance, and employed instructional practices that could lower future achievement and engagement in math (Rattan, Good, & Dweck, 2011). The participants were given a seven-item scale ranging from strongly disagree (1) to strongly agree (6). The findings from this second study by Rattan, Good, and Dweck (2011) found that participants in the entity condition had a much higher level of fixed belief about intelligence than those in the incremental condition. Similarly, participants in the entity theory condition agreed significantly more that their student “was not smart enough in math” when compared to those in the incremental condition. Participants in the entity theory condition were also significantly more likely to endorse the overall index of comfort-style strategies and strategies used to reduce future achievement in math as opposed to the incremental condition.

The findings from studies one and two were repeated in study three (Rattan et al., 2011), which used 41 actual graduate students who worked as teaching assistants or instructors rather than those who pretended to be teachers. Rattan, Good, and Dweck (2011) found that among college teachers or those imagining themselves as college teachers, those who believe in an entity (rather than incremental) theory of intelligence are more liable to "identify a student as having low ability based on a single test score, more likely to opt to comfort students for their low ability, and more probable to utilize

teaching strategies that are less beneficial to students' continued engagement with the field" (Rattan et al., 2011, p. 734).

Would an instructor's entity theory and low expectations be mirrored in his or her behaviors, as well as communicated to students, causing students to report less motivation and fewer academic standards? In a 2012 study Rattan et. al discovered that teachers' mindsets can influence how they respond to students, which in turn affects the students' outcomes. According to the findings of this study, educators who have a fixed mindset about math ability are more likely to judge students as having low potential than their growth-minded counterparts. Additionally, educators with a fixed mindset were more likely to console students about their perceived lack of math abilities and use kind strategies. They used "comfort-oriented" feedback, in which they told their students that their inability to succeed in math was fine, and they also attempted to make math easier by lowering expectations. When compared to "strategy-oriented" feedback, this comfort-oriented feedback was associated with lower motivation in students as well as lower expectations for their own performance in a separate study reported in the same paper.

These studies offer insights into how a teacher's mindset is actualized and manifested in their practice and how they affect positively or negatively their students' learning experiences.

Teacher's Mindsets and Their Instructional Practices

A growing substantial body of research indicate that teachers' mindsets play a key role and are highly interrelated to teacher's practice. In fact, research exploring fixed and growth mindset theories and their relationship to the ways in which teachers understand intelligence and student achievement, demonstrate that beliefs reflect the actual nature of

the instructional strategies a teacher employs while teaching (Kagan, 1992; Muis & Foy, 2010; Pajares, 1992; Tickle, Brownlee & Nailon, 2005).

These notions are in accordance with emerging literature on the impact of mindset views on pedagogical practice (Rattan, Good, and Dweck, 2012). According to Rattan et al. (2012) the potential impacts of mindset on pedagogical practice that instructors might use when students demonstrate difficulty show that mindset beliefs may impact pedagogical practice. For instance, in three exploratory case studies that included classroom observations and stimulated recall interviews with a total of six teachers, (Rissanen et al., 2018a; Ronkainen, Kuusisto & Tirri, 2018) found that teachers who had an overall tendency toward either a fixed or a growth mindset make sense of their students' behavior, learning, and achievements and this meaning-making influences the teachers' understanding of the teaching-studying-learning process and their classroom practices in general. From these studies evidence of teachers' mindsets implications on their pedagogical practices is gained as well as depiction of teachers' role in shaping mindsets (e.g., Jonsson & Beach, 2012; Rattan et al., 2012; Schmidt et al., 2015). These studies also demonstrate formidable evidence of how key is teachers' mindsets is to their practice and student learning.

Instructional Practices Associated with Teachers' Growth or Fixed Mindsets

A number of studies have tried to delineate instructional practices that characterize different mindsets along with demonstrating that teacher's perceptions of the causes of students' behavior and particularly their mindset strongly and powerfully shape their own behaviors and interactions with students (Rattan et al., 2012; Rissanen, Kuusisto, Hanhimaki, & Tirri, 2018a, b; Ronkainen, Kuusisto, & Tirri, 2018). Some of

these instructional practices can also be seen in a study by Rissanen, Kuusisto, Tuominen & Tirri, (2019) which creates a framework for a growth mindset pedagogy in basic education, gathering key features of classroom practices associated with a teacher's incremental meaning system (a network of beliefs connected to growth mindset, e.g., Plaks, Levy, & Dweck, 2009). The key features or instructional practices forming the growth mindset pedagogy framework include supporting student's individual learning processes, promoting mastery orientation, persistence and fostering students' process-focused thinking. Below are these instructional practices briefly covered.

Supporting Student's Individual Learning Processes

Teachers with a growth mindset have been found to less likely make quick, stereotypical judgments about students' talents or moral character than teachers with a fixed mindset, and they spend more time in one-on-one interactions with students in order to get to know them and give them individualized support (Rissanen et al., 2018a, b; Ronkainen et al., 2018). Furthermore, differentiation becomes the basis of pedagogical practice for teachers who exhibit a growth mindset.

Promoting Mastery Orientation

Another key instructional feature associated with a teachers' growth mindset is the tendency of their pedagogy being process focused. This implies promoting a mastery orientation in the classroom where progress and learning goals are emphasized, and performance or achievements are not deemed as relevant. This means, for instance, that the emphasis is strongly on formative instead of summative assessment. Students are not encouraged to compete and compare their achievements with other students, but rather to analyze their own progress and learning (Rissanen et al. 2018).

Building Persistence

Another thing found to be common among teachers with a dominant growth mindset is persistence. This means that a teacher is rather strict and does not give up on students or leave room for helpless behavior patterns but expects good behavior and tirelessly demands that students put effort into studying. Persistent teachers have a firm belief in a teacher's power to influence students' studying-learning processes and in developing students' moral character. In their study observations, (Rattan et al., 2012), notes that fixed mindset teachers sometimes seem to protect students (especially the ones they regard “weak”) from challenges and all kinds of criticism, and to use comforting feedback but teachers with a growth mindset more courageously give guidance through honest critical feedback, for instance, by using the words “not yet”, which leaves space and gives hope for improvement and motivation to continue (Ronkainen et al., 2018).

Fostering Students' Process-Focused Thinking

Ronkainen et al., (2018) also found that teachers with a growth mindset had a tendency to engage in process-focused pedagogical thinking and are likely to foster students' process-focused thinking associated with a growth mindset. A key factor here is the kind of student feedback such teachers provide: they tend to praise courage, strategies, and effort instead of achievements and personal qualities. By emphasizing learning-to-learn goals and teaching learning strategies, growth mindset teachers help students, both explicitly and implicitly, to find reasons for their difficulties outside their personal qualities and thereby foster incremental beliefs. They help students cope with mistakes and teach how failures and challenges play roles as learning opportunities. Even though in their study they did not measure student outcomes, a study by Schmidt et al. (2015) illustrated how these kinds of “growth mindset messages” together with a teacher's

process-focused practices support students' growth mindset and are linked with students' better academic achievement in the long term.

Teachers' Mindsets and Student' Achievement

Less research has been conducted on the relationship between teachers' mindsets and student achievement. These studies have been studied from two perspectives in the literature leading to promising insights into the relationship between teachers' mindsets and student achievement. These two perspectives view teachers' mindsets as a cause in students' academic achievement and as a mediator in student academic achievement. In support of teachers' mindsets as the root cause of student achievement, Schmidt, Shumow, and Kackar-Cam (2015) discovered that teachers played a critical role in classroom intervention by analyzing quantitative data from 160 American seventh-grade science students and their two teachers. In this study, students participated in a Brainology intervention program while teachers' interactions in the classroom were observed. According to the study, Brainology had a positive, but short-term, effect on students' science academic achievement. The intervention's impact on learners whose teachers used growth mindset language and messages in the classroom lasted for several months. The impact of the intervention did not continue for learners whose teacher had a fixed mindset and provided fixed mindset messages in the classroom, and students' achievement was considerably lower. Interestingly, teachers associated educational practices had varied effects on their students' mindsets and accomplishment.

Despite the promising results, it is still inconclusive because of contrasting results. For example, a study by Donohoe, Topping, and Hannah (2012) to analyze 33 secondary-school kids in Scotland, they used quasi-experimental pre-, post-, and follow-up mixed-methods research and found that Brainology intervention first “encouraged a

growth attitude in the learners, supporting the pre-post results of earlier studies,” (p. 653). However, no significant change in examination performance was identified between the intervention and comparison groups one year later. In other words, follow-up demonstrated that the adjustment in perspective was not sustained, which could be explained by the teachers' role, according to Schmidt et al. (2013). This unsustained change could also be explained in cases where teachers attempt to instill growth mindset thinking by focusing on changing students' beliefs without changing their teaching practices to create an environment that consistently supports growth mindset thinking leading to sustained and persistent performance (Dweck, 2015). It is therefore recommended that teachers growth mindsets messages should be supported and accompanied by the appropriate teaching practices to be effective and long lasting (Dweck 2006).

In view of teachers' mindsets as mediator in students' achievement two studies from Finland indicated that teacher's mindset could moderate the relationship among parents' mindset and their children potential in academics. For instance, centered around ratings of teachers Kärkkäinen and Rätty (2010) found that the more optimistic children's parents are, the higher their children's confidence in their own talents, and hence the bigger their academic potential. The researchers also found a "moderate and significant association" between teachers' and parents' assessments of their children's ability. This discovery was in line with previous research that had found that a teacher's mindset toward a child's potential was linked to the attitude of the child's mother (Rätty, Kasanen, & Kärkkäinen, 2006). All these studies thus indicate that there could be a relation between a teacher's mindset and students' achievement whether direct or indirect.

Intervention studies have also shown that students' academic achievement can be improved by changing their mindset. Following an examination of the theoretical foundations of mindset, Yeager and Walton (2011) concluded that instructors' influence could be significant. Interventions in the educational environment that “target students' subjective experience” (p. 267), “developing powerful yet stealthy persuasive tactics” (p. 285) for imparting psychological ideas, and “tapping into recursive processes” (p. 285) are particularly noteworthy (p. 267).

Teachers' Mindsets in Closing Achievement Gaps

Research indicates that teachers' beliefs on whether intelligence is fixed or malleable strongly influence their students and may have far-reaching implications for closing achievement gaps. In a study by Canning, et al, (2019) discovered that racial achievement gaps in courses taught by instructors with a fixed mindset were twice as large as those in courses taught by instructors with a growth mindset in a longitudinal, university-wide study of 150 STEM professors and more than 15,000 students. Course evaluations revealed that students were less motivated and had more negative experiences in classes taught by fixed-mindset instructors. An instructor's mindset predicted student achievement and motivation more than other factors such as gender, race or ethnicity, age, teaching experience, or tenure status.

Further, Good, Aronson, and Inzlicht (2003) conducted a field experiment study investigating whether teaching minority and low-income students' different ways to understand academic challenges could reduce their vulnerability to stereotype threat and increase standardized test performances. In this study it was found that seventh grade students in the experimental group upon being taught about the expandability of intelligence earned significantly higher reading standardized test scores when compared

to the control group. From this study it is then concluded that minority populations can be empowered to resist vulnerability to stereotype threat by developing a growth mindset approach to their own intelligence and resiliency; this in turn will help underrepresented populations with academic struggles and challenges that stereotype impose upon them.

Pedagogical Considerations in Competency-Based Education

This study was conducted in the Kenyan context where the education system is currently based on a competence-based curriculum. In competency-based education, pedagogical considerations must include paying attention to the needs and styles of learners, giving students the time, they need to acquire and consistently demonstrate or perform the expected competencies (knowledge, skills, and professional behaviors), and creating a supportive learning environment. Even though several teaching approaches (instructional practices) can be utilized in competency-based education, all curricula must be evidence-based and outcome-focused. Also, all teaching tactics must be linked to their learning area (psychomotor, cognitive, and affective) (Neil O'Sullivan & Bruce, 2014).

Additionally, Competence-based education is highly inspired by a growth mindset, one of the various quality principles of design in a competence-based education (Sturgis & Casey, 2018a). Moreover, a critical aspect to keep in mind is that while a growth mindset is based on social learning theory, it also implicitly includes strong constructivist principles. As a result, the researcher of this study has tentatively framed the instructional approaches examined and analyzed in this study to be consistent with a growth mindset or constructivist viewpoint as drawn from the existing literature.

Initial Conceptual Understanding

This study examined the relationship between teachers' mindsets, instructional practices, and student achievement. To achieve this, relevant theoretical and empirical

research was drawn upon to build up an initial conceptual understanding. This understanding is presented in what follows in this section.

It is well established that beliefs influence many elements of learning and teaching and that they are the best predictors of the decisions people make throughout their lives (Bandura, 1986; Nisbett & Ross, 1980). As a result, beliefs constitute a legitimate research topic that cuts across many fields (Pajares, 1992). Furthermore, Pajares (1992) points out that instructors' beliefs are established as a result of intense experiences or a series of events rather than by coincidence. These sentiments are echoed by Nespor (1987), who claims that beliefs derive their potency from earlier episodes or events that color current events' understanding and that such episodes play a crucial part in teachers' beliefs.

Beliefs can be conceived as a set of interrelated views in a larger, more general belief structure or system that an individual holds. These belief systems serve an “adaptive function in helping individuals define and understand the world and themselves” (Pajares, 1992, p. 325). Within this overarching system, subsystems or substructures containing related but distinct beliefs are held (Schommer-Aikins, 2004). For example, within a teacher’s overall belief system, she may hold subsystems of epistemic beliefs (e.g., Schommer-Aikins, 2004), intelligence beliefs (e.g., Yeager & Dweck, 2012), or achievement values (e.g., Wigfield & Eccles, 2000). Belief subsystems may be domain or task specific (e.g., Buehl & Alexander, 2006) and may or may not demonstrate cohesion across beliefs within the same individual (Pajares, 1992; Rokeach, 1968).

Moreover, within the belief system, specific beliefs or belief subsystems can serve as filters, frames, and guides (e.g., Fives & Buehl, 2012). Beliefs acting as filters influence

how information and experiences are seen or understood by the individual. Beliefs may also act as frames that are purposefully engaged during problem-solving tasks. In teaching practice, a task such as lesson planning may require the teacher to purposefully consider multiple beliefs (e.g., beliefs about students, content, pacing) to frame the problem space and make decisions. These beliefs interact within the teacher to frame the task at hand. Another function of beliefs is to guide actions (Fives & Buehl, 2012; Pajares, 1992; Rokeach, 1968). The more central the belief or belief subsystem, the more likely it is to guide actions.

In this study, the focus was particularly on belief subsystems that include beliefs about students' intelligence and ability. A key assumption here is that teachers' beliefs on their student's intelligence and ability are central within the teacher's system and as such they filter and frame perspectives on the instructional or teaching practices they adopt or do value or not value. Besides Dweck and colleagues have established a long and persuasive line of research about the influence of implicit theories, or mind-sets, for intelligence and personality on outcomes such as academic achievement and peer relationships (e.g., Dweck, 2006). It is also argued that teachers' beliefs impact behaviors, beliefs of individuals subsequently influencing how teacher teaches and plans and the assessment strategies they adopt (Kagan, 1992; Muis & Foy, 2010) and even student achievement (Donohoe, Topping, and Hannah, 2012; Schmidt, Shumow, and Kackar-Cam, 2015; Kärkkäinen, Rätty, and Kasanen, 2010; Jonsson and Beach, 2012; Shim, Cho, and Cassady, 2013).

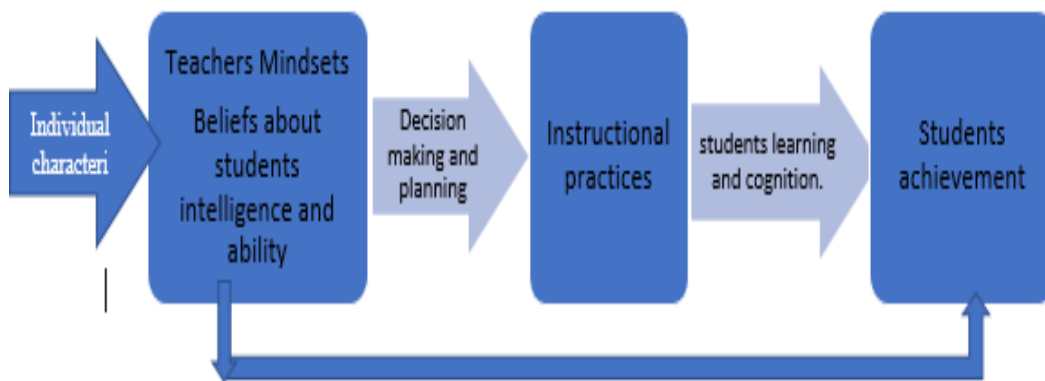
Considering the above, this study was designed from the conception that teachers' beliefs function as filters and frames. That is, beliefs about intelligence and ability as fixed or learned may explicitly or implicitly limit and focus (filter) the information

garnered from experiences and can be used to bound or articulate (frame) a space for decision making (Fives & Buehl, 2012). Serving either function, it is suggested that teachers' beliefs about their students' ability are a key part of their view of their students' and consequently serve as a central belief when engaged in their practice.

Given their central position, the beliefs (implicit beliefs) are likely to influence or frame how teachers teach, the kind of instructional practices and learning opportunities they accord their students and subsequently how learners learn and achieve. Given the above, the initial conceptual understanding informing this study data collection and analysis as it examines the relationship between teachers' mindsets, instructional practices and student achievement aligns with these understandings from the literature. Below is a visual representation of the conceptual framework used in this study.

Figure 1

A schematic presentation of the conceptual framework



CHAPTER 3

METHODOLOGY

Introduction

This chapter presents the research paradigm, the study's design, particularly the research methods and techniques used, the study subjects and how they were chosen, determination of the sample size, instruments used, their validation, data analysis, and findings.

Research Paradigm

Mixed-Methods research is described as a category of research where a mix of quantitative and qualitative research methods is utilized using different strategies and approaches to a single study (Bryman 2016). A fundamental premise in a mixed-methods approach is that neither the quantitative nor the qualitative method alone is sufficient, but a combined use of both methods can assist in generating a more complete picture and a thorough understanding of a topic, as well as a more comprehensive analysis (Johnson et al., 2007; Ivankova, Creswell & Stick., 2006). In fact, alongside the quantitative and qualitative research paradigms, Mixed-Methods research has become more pronounced and is now acknowledged as a third main research paradigm (Creswell & Plano-Clark, 2007; Johnson et al., 2007).

Research Design

This study aimed to investigate the interplay between teachers' mindsets, their classroom instructional practices, and student achievement, using a two-phased,

sequential explanatory mixed-methods approach. According to Creswell, Plano, Gutmann & Hanson (2003), a mixed-methods approach has a more significant potential for yielding an understanding of research questions and complex phenomena than when quantitative or qualitative methods are used separately. From this perspective, a quantitative method was used to collect data that was used upon analysis to select participants for the follow-up interviews to clarify the study results. In the first part, the quantitative research questions addressed were what are the teachers' mindsets in the various district schools, and is there a relationship amongst these mindsets, the instruction practices teachers adopt in the classroom, and student achievement. In the second phase, qualitative semi-structured interviews (appendix B) were conducted to explore how teachers with varying mindsets described the role their mindsets played in relation to planning decisions and the instructional practices they might adopt or use in the classroom.

Data collected through the interviews were analyzed, noting consistencies, deviations from interview responses, and their instructional practices, and overarching themes and patterns in their practices were included in the final analysis of this study.

Rationale for the Mixed-Method Design

Quantitative and qualitative research paradigms offer researchers many alternatives to do their research (Creswell & Plano Clark, 2007). However, choosing which method to use, one needs to consider some aspects. Researchers recommend that the best method that can offer the best chance of obtaining useful answers should be the force behind the research methodology (Johnson, Onwuegbuzie, Turner, 2007; Mt. Collins & O' Cathain, 2009). In short, the purpose of the study should be the drive behind the methodology used (Newman, Ridenour, Newman, & DeMarco, 2003). Moreover,

according to Creswell & Plano, Clark (2007), there are cases when a single research approach, whether qualitative or quantitative, is insufficient to answer the research questions. For instance, in some cases, the results accrued from the quantitative method may not explain outcomes, necessitating qualitative data usage to interpret further, enrich, or explain the quantitative findings. In other cases, exploring a topic qualitatively may be sufficient, but quantitative data is required to fully comprehend the issues under investigation (Creswell & Plano-Clark, 2007). In this study, the mixed methods design was used because the quantitative part was needed for the purposeful selection of the participants for the qualitative part. Also, the quantitative method was deemed insufficient to explain the outcomes. Thus, the qualitative part was required to explore further, provide an explanation for the quantitative findings, and offer a full comprehension of the research questions upon integrating both the research methods (quantitative & qualitative).

The Methodology: Two-Phase Sequential Explanatory Research Design

As stated earlier, this study adopts a mixed-method approach (two-phase sequential explanatory research design) that comprises two distinct methods: quantitative and qualitative (Creswell, Plano Clark, Gutmann, and Hanson 2003). Using this approach, important decisions had to be made regarding how these two methods related to each other. In the first phase, the development and implementation of the quantitative strand occurred, which was the collection and analysis of quantitative data. The quantitative findings were then used to drive the qualitative strand. Specifically, quantitative data were utilized to design and refine qualitative research questions and for purposeful sampling and data gathering (Creswell & Plano-Clark, 2011). The qualitative phase was then

implemented in the final stage, where qualitative data were gathered and examined. This stage enabled insights and further delving into the perspectives of the participants.

Data were gathered over two periods (Creswell & Plano-Clark, 2011). The quantitative data was first collected to identify the teachers' mindsets and their relationship to their instructional practices and students' achievement, as shown by their performance on standardized tests based on the school's records. The quantitative findings were also used for the purposeful selection of the participants. These participants exhibited different strong mindsets, i.e., strong fixed and strong growth mindsets and mixed mindsets.

The findings from the qualitative part were then related to the quantitative strand findings. Thus, the data from the quantitative results provided general findings of the research problem, while the qualitative part and the further analysis cast insights into the statistical findings through exploration of the subjects' viewpoints. The figure below illustrates the steps followed in the sequential explanatory mixed-methods design.

Table 1

Sequential Explanatory Mixed-methods Design Steps

Phase	Procedure	Product
1. Quantitative Strand		
Quantitative data collection	Mindset survey Instructional practices survey Student achievement scores	Numerical data
Quantitative analysis	Data screening (Multivariate Factor analysis Structural equation modeling	Descriptive statistics Factor loadings Model measurements
Connecting Quantitative and Qualitative phase	Purposeful sampling of participants from quantitative part based on Three subjects with varying mindsets (N=3 growth, N=3 fixed and N=3 mixed mindset)	Selection of Cases (n=9)
2. Qualitative Strand		
Qualitative data collection	Individual in-depth interview	Interview transcripts
Qualitative data analysis	Thematic analysis Comparing and data analysis	Codes and themes
Integration of the Quantitative and Qualitative results	Interpretation and explanation of the quantitative and qualitative results	Discussion Implications Future research

The Quantitative Strand

The quantitative strand entails a set of techniques concerned with systematically investigating the phenomena under investigation using statistical or numerical data. As a

result, it involves measurements with the assumption that the phenomena being examined can be measured. It sets out to analyze trends and relationships in data and verify the measurements taken. Thus, the quantitative strand is aimed at identifying teachers' mindsets and examining the relationship among these teachers' mindsets, instructional practices, and student achievement.

Participants and Sampling

The quantitative strand of the study used a purposive sampling that yielded a population of n=211 participants. The purposive sampling was chosen because it matched better the aims of the study and thus improved the rigor and trustworthiness of the study data and findings. The participants were selected on the basis of being teachers teaching at the public county level schools (well and poor performing), as reflected in the national exams' records. The schools also had to be within the Nairobi County. The researcher targeted an average of 20 teachers per school (10 schools) but only an average of 13 were achieved per school.

This yielded a number lower than the targeted one and therefore the researcher had to add more schools to achieve the targeted population using the same criteria of selection. At the end a total of 21 county schools participated in the study with an average of 10 per school participating.

Data Collection

The schools targeted for this study were notified through a request letter to school principals informing them of the researchers' intention in carrying out a study and what the study was about beforehand. Also, follow-up was done through a phone call or in person. After gaining approval, data collection was completed in person. Participants were provided with information regarding the confidentiality of their responses, the

questionnaires, and why their participation would be important. The participants were also given notice that they might be contacted for further study in phase 2 on a voluntary basis.

Response Rate

The researcher disbursed a total of $n = 400$ questionnaires to the target population. After that, the questionnaires were collected. A total of 211 were returned duly and appropriately filled out. This culminated in a response rate of approximately 53%.

Instruments for Data Collection

The quantitative part included three data collection instruments: a mindset survey to measure the teachers' mindsets. In this case, Dweck's Theories of Intelligence Scale (Dweck & Leggett, 1988; Dweck, Chiu & Hong, 1995) was adapted (Appendix A). The reliability and validity of the scale can be found in six validation studies (Dweck et al., 1995). Across the studies, the implicit theory of intelligence measure has high internal reliability ranging from .94 to .98. The responses by individual teachers from the survey were then scored, sorted, and separated to identify those teachers who exhibited growth, fixed, or mixed mindsets. Noteworthy, the terms "growth and fixed mindset" were not used in the survey to avert the occurrence of priming. Teachers were, however, correctly informed that as a precursor, the survey was intended to identify teachers who would be considered for an interview to identify themes of instructional practices that they use in classrooms.

Teachers were also requested to complete the second part of the survey (Instructional practices survey) the researcher made and comprises different instructional practices statements associated with the growth mindset pedagogy as covered in the

literature (Part two) (Appendix A). This survey helped categorize the teachers' instructional practices, whether they aligned with a growth mindset or leaned towards a fixed mindset. Finally, to gather data on students' achievement, students' standardized test scores from a test (MOCK) were used. The student achievement scores considered here applied to the students' mean score per subject taught by each teacher participant and in just a single grade. The students' scores per subject are made public and were used anonymously in this research. Each questionnaire was coded, and a number was assigned to all teachers participating in identifying those individuals who wished to take part in the qualitative strand comprised of an interview.

The mindset survey adopted for this study is Dweck's Implicit Theories of Intelligence Scale (and is a three-item assessment designed to assess an individual's growth or fixed mindset, otherwise referred to as incremental and entity theory. Responses from the teacher's mindset survey were grouped using excel. To form a general implicit theory, the item scores were averaged. A general implicit score of 3.0 or below indicated a fixed mindset (entity theorist), while a score of 4.0 or above indicated a growth mindset (incremental theorist) (Dweck, Chiu, & Hong, 1995). The aggregated responses were used to define and group teachers having a growth mindset, mixed mindset, or fixed mindset.

Statements in the Instructional practices survey align with different instructional approaches that can be either aligned with a fixed mindset or growth mindset orientation. The instructional practices survey used a five-point Likert scale (1=strongly disagree to 5=strongly agree). Descriptive statistics were used to analyze the survey data. Teachers whose responses agree with the statements in this survey were considered to align with growth mindsets. In contrast, those who disagreed with these statements were considered

to align with a fixed mindset practice. This characterization was not intended to evaluate the effectiveness of instructional practices and methods. Still, it allowed us to identify and classify the alignment of certain teachers' practices, whether they orient towards a fixed mindset or growth mindset.

Data Analysis

Three overarching research questions were covered. Data analysis was carried out in two strands, given this is a mixed-methods study. The first two research questions were analyzed quantitatively. Since the second strand of the study's purpose was to explore and build on the findings of the first quantitative strand (Creswell et al. 2003), the third research question, which was designed to provide insights into the observed links between the variables under consideration (mindset, instructional practices, and student achievement) was used for analysis.

In the first part (quantitative), two statistical software packages were utilized: Excel and the “R” statistical software (R Core Team, 2018). Excel was used to sort and aggregate data, while “R” software was used to conduct descriptive analysis and structural equation modeling. Descriptive statistics aided in the first research question that examined the mindsets of teachers participating in the study. The structural equation modeling helped examine the second research question that sought to examine relations among the observed teachers’ mindsets, instructional practices, and students’ achievement.

Descriptive Statistics

Demographic characteristics of the participants were examined, and their frequencies and percentages were presented. Numerical data from the mindset survey was also analyzed, and the various mindsets of teachers determined.

Structural Equation Modeling

Structural equation modeling (SEM) was used to answer this study's second and main research question that examined the relationship between teacher mindset, instructional practices, and student achievement.

Structural Equation Modeling (SEM), according to Byrne (2013), is a comprehensive collection of multivariate analysis approaches that specifies the relationships between variables using two sets of equations: measurement equations and structural equations. Measurement equations examine relationships between latent variables (variables not directly measured), and their related indicators determine the accuracy of proposed measurements. The structural equations guide the evaluation of postulated links between latent variables, allowing the statistical hypotheses for the study to be tested.

When conducting a structural equation model (SEM) or confirmatory factor analysis (CFA), it is often recommended to test for multivariate normality. This is because normality is one of the basic assumptions required to conduct structural equation modeling (SEM) (Byrne, 2013). Accordingly, normality was tested in the first step using QQ plots and the Henze-Zikler test.

Further basic steps of SEM were followed in the analysis. The main steps of SEM followed in the study were model specification, identification, parameter estimations, model evaluation, and model modification. According to (Kline 2012; Byrne 2013), the

model specification defines the hypothesized relationships among the variables in SEM-based on one's knowledge. The researcher thus specifies the model by defining every link between variables important to the researcher's interest in the model specification. This can be achieved through the tentative translation of theory or empirical research findings. In this case, the model was specified as detailed in the conceptual framework that outlined the postulated relations between the variables. It was hypothesized that teachers' mindsets guide teachers' instructional practices, influencing students' achievement.

Model identification refers to the idea that a model is "estimable," or more precisely, whether there is a single best solution for the parameters specified in the model. It is a bad idea to (statistically) fit all the variables in the model; therefore, factor analysis was used to identify the most important observed exogenous variables for the two latent exogenous variables in this study. Factor analysis is the process of condensing a large number of factors into a small number of them, making it easier to deal with study data. The argument is that deeper causes drive underlying concepts in data; one can find and work with such rather than the other variables that cascade from them and are lower level. Factor loadings larger than 0.5 were chosen for further examination in the fitted model.

The Measurement Model and Assessment. The measurement model specifies the correspondence rules between measured and latent variables (Hair et al., 2010). Further, it enables the researcher to use any number of variables for a single independent or dependent construct. The two main criteria used in analysis to assess the measurement model include validity and reliability. Reliability test tries to find stability and the consistency of the measuring instrument, whereas validity tests try to determine how accurate an instrument measures a particular concept it is designed to measure. The measurement model analysis considered individual item reliability, internal consistency,

and construct validity. The cut-off of good reliability lies in the scores between 0.6 and 0.7 (Hensele & Sarstedt, 2013).

Testing of the Model's Fitness. Overall model fit was assessed using various goodness-of-fit indexes, including the Chi-square test (χ^2), which tests the hypothesis that there is a discrepancy between the model-implied covariance matrix and the original covariance matrix. Root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) where RMSEA is a "badness of fit" index with 0 indicating the perfect fit and higher values indicating the lack of fit (Chen, Curran, Bollen, Kirby & Paxton, 2008). The comparative fit index (CFI) represents the variance accounted for in a covariance matrix. CFI ranges from 0.0 to 1.0, with a higher value indicating a better model fit. The CFI should be close to 0.95 or higher (Kline, 2015). Based on the finding from these fit indices, a decision to retain or modify the model were made.

Structural Model and its Assessment. An adequate number of known correlations or covariance is necessary to assess the structural links among theoretical components in SEM and create a reasonable set of findings. According to Kline, 2010 this is carried out mainly using path analysis using the acceptable model's latent variables. The statistics literature demonstrates no universal standards for an appropriate model; nonetheless, because Chi-square statistics is one of the most often used tools to test model fit, a lower chi-square to df ratio suggests a better model fit. On the other hand, the SEM technique examines the values of the Adjusted Goodness of Fit Index (Values above 0.90), with a desirable chi-square to degrees of freedom ratio of less than two, suggesting that the model fits. These were the measures used to assess the structural model. Based

on the finding, the researcher then progressed into interpreting the regression coefficients which gives insights into the examined relations between the variables under study.

Qualitative Strand

The goal of the follow-up, qualitative study strand was to elaborate on the quantitative survey results in more depth and obtain a more detailed understanding of how teachers' mindsets inform or not their instructional practices.

Participant Selection

In qualitative research, purposeful sampling is commonly used to identify and choose the information-rich cases pertaining to the phenomenon of interest. Creswell (2014) also states that those who participate in the qualitative component of a sequential explanatory mixed-methods design should have taken part in the preliminary quantitative component. Furthermore, Creswell and Plano (2011) note that the qualitative strand has a significantly lower number of participants than the quantitative strand. Considering this, to have a sample that can produce "information rich" cases a total purposeful sample of (n=9) teacher participants exhibiting a strong range of mindsets from fixed 3, growth 3, mixed mindsets 3 were selected.

Data Collection

In this qualitative strand, data was collected using in-depth semi-structured interviews. According to Seidman, 2006, the in-depth interviews help understand the lived experiences of individuals and the meaning they deduce from those experiences. Furthermore, semi-structured interviews enable the researcher to use probes for further exploration of research questions, subsequently allowing comparisons to be made across interviews (Xerri, 2018). Therefore, the interview enabled gaining of further in-depth

understanding of how these selected teachers conceived their mindset, perceived students in their classrooms, and instructional practices they chose to "fit" their perceptions of their learners' intelligence and ability.

Data Analysis

Thematic analysis was used in the analyses of the qualitative data in this study. According to Saldana (2021), like grounded theory, thematic analysis requires more participation and interpretation from the researcher. In this sense, thematic analysis, as used here, went beyond counting explicit words or phrases and aimed on identifying and describing implicit and explicit ideas in the data. This approach also involved careful analytic attention to the data that included comparing code frequencies, identifying co-occurrence, and identifying relationships among codes within the data set in a series of cumulative coding cycles that ultimately led to the formation of themes. The developed codes were also used to represent the identified themes and apply them to or link them to the raw data to summarize them for the subsequent write-up.

The researcher's personal computer was used to download and transcribe the audio recording of the interview. Shortly after the interviews were completed, the recorded audios were transcribed into electronic text format. All transcripts were coded using open and selective coding after a thematic analysis of the data. The themes formed within the context of each transcribed interview were compared before being incorporated into shared coded themes. The newly formed themes were then cross-checked against the literature. The total number of questions per interview was five making a total of 45 questions coded from all nine interview transcripts; this coding was done numerous times over several weeks for consistency.

Integration of Quantitative and Qualitative Data

According to Creswell and Plano Clark (2011), integration can be conceptualized as linking data collection and analysis methods. Linking can take several forms, including connecting, building, merging, and embedding. In a single line of inquiry, integration may occur through one or more of these approaches. In this study, the integration of data was through connecting and merging. Integration occurs when one type of data connects with another via the sampling frame. This is especially the case in a study that includes a survey and qualitative interviews. The interviewees were chosen from among those who responded to the survey. As for this study, therefore, the connecting approach was through the quantitative findings being used for the purposeful sampling of the participants in the qualitative part.

Further, when researchers combine the two databases for analysis or comparison, they integrate through data merging. Ideally, during the design phase, a strategy is developed to ensure that collecting both types of data will allow their merging, as this was the case in this study. For instance, quantitative data were collected using a scaled instrument (surveys), and qualitative data were collected using parallel or similar questions (Castro, Kellison, Boyd & Kopak, 2010). After statistical analysis of numerical data and qualitative textual data collected through semi-structured interviews, Merging was then done. A vital aspect of this study was that merging was not done for comparison but for enriching and deepening the analysis, as the aim was not to compare the data. Merging the data here was meant to give depth to the quantitative findings and complement and enrich the results for a broader understanding of the research questions.

Quality Criteria

Teddlie and Tashakkori (2003) argue that when conceptualizing validity of the mixed methods research, researchers “should adopt a common nomenclature that

transcends the separate QUAL and QUAN orientations’’ (p.12). They then recommend the use of the term “inference quality” to refer to the mixed-method research phrase for validity. Furthermore, the definition of inference quality is linked to two research components: design quality and interpretive rigor. Design quality refers to the standards used to assess the methodological rigor of a mixed research study, whereas interpretive rigor refers to the measures used to evaluate the validity of conclusions.

Thus, to ensure quality in this mixed methods research, an integrative model of quality comprising design quality and interpretive rigor was adopted (Tashakkori and Teddlie 2003, 2006). According to this model, design quality consists of (a) within-design consistency (consistency of the procedures/design of the study and from which the inference emerged), (b) design suitability (i.e., whether the methods of the study are appropriate for addressing the research question(s); and the design is consistent with the research questions), (c) design fidelity (i.e., whether the procedures are implemented with quality and rigor; the methods are capable of capturing meaning, associations, or effects; and the components of the design such as sampling and data collection procedures, are implemented adequately); and (d) analytic adequacy (i.e., whether the data analysis techniques are appropriate for addressing the research question(s).

Interpretive rigor consists of (a) interpretive agreement (consistency of interpretations across people), (b) interpretive distinctiveness (the degree to which the inferences are distinctively different from other possible interpretations of the results and rival explanations are ruled out), (c) interpretive consistency (i.e., whether the inferences closely follow the relevant findings in terms of type, intensity, and scope; and the multiple inferences made based on the findings are consistent with each other), (c) theoretical consistency (i.e., whether the inferences are consistent with theory and the state of

knowledge in the field), and integrative efficacy (i.e., whether the meta-inference adequately incorporates the inferences stemming from quantitative and qualitative phases of the study).

Considering the above, to ensure the design quality in terms of methodological rigor, this study adhered to the planned procedures in a mixed-methods design, as indicated in figure (b) mentioned earlier in the study and the corresponding data analysis methods. This ensured that the study adhered to the within-design consistency, design suitability, design fidelity, and analytic adequacy. As for the interpretive rigor, key measures were implemented. These measures concern how the findings are presented. The findings are consistent across all the participants, ensuring that what is presented is the actual meanings of the respondents' utterances. For example, a key characteristic is the inclusion of detailed descriptions and actual participant quotes. Also, Additionally, any interpretation and conclusions derived in the study are supported by the relevant literature in the field. Also, the integration of data adequately incorporates findings from both the study phases. All these measures were utilized to cover the quality criteria in this study.

Ethical Considerations

This study followed the ethics code for social science research conducted by the Institute Research Board (IRB) adopted at the American University of Beirut. The study was conducted upon full approval by the American University of Beirut Institutional Review Board (AUB-IRB).

Limitations of the Study

This study used a convenient purposive sample restricted to a specific area. The participants in the present study were recruited from a single county in Kenya, and the

educational context may differ from that of other counties, countries, and cultures. This could affect generalizability of the findings. Moreover, in the current study, we focused on a few factors to explain the relationship between mindset, instructional practices, and student achievement. However, our model reflects that there are other factors not captured in the model that could play an important role in influencing the relationships. While this may limit the results, it is important for further research to include these factors as mediating or moderating variables to better understand the relationships between mindset, instructional practices, and student achievement.

CHAPTER 4

RESULTS

Introduction

This part presents the study's findings for the quantitative and the qualitative strands, respectively. In the first part, the study intended to investigate if there is a relationship between teachers' mindsets, instructional practices, and student achievement. In the second part, to gain an in-depth understanding of the quantitative findings, the researcher also qualitatively explored how teachers rationalized their mindsets regarding their student's ability or intelligence reflected in and connected to their self-reported instructional practices.

Quantitative Strand Findings

Demographic Information on the Study Participants

The first part of the questionnaire entailed demographical information of the study's participants, comprising their gender, years of teaching experience, and teaching area (arts, humanities, and sciences). Of the 211 participants, 117 were female (55%), and ninety-four were male (45%). Their years of teaching experience were as follows; 102 participants had 0-5 years (48%), 56 participants had 6-10 years of teaching experience (27%), 23 participants had 11-15 years' experience (11%), 11 teachers had 16-20 years' experience (5%), ten teachers had 21-25 years' experience (5%), six teachers had 26-30 years (3%), and three teachers had teaching experience of over 31+ years (1%). In the area of teaching, 55 teachers were in the arts (26%), 68 humanities (32%), and 88 sciences and math (42%). The table below showcases the demographics of the surveyed participants.

Figure 2

Gender

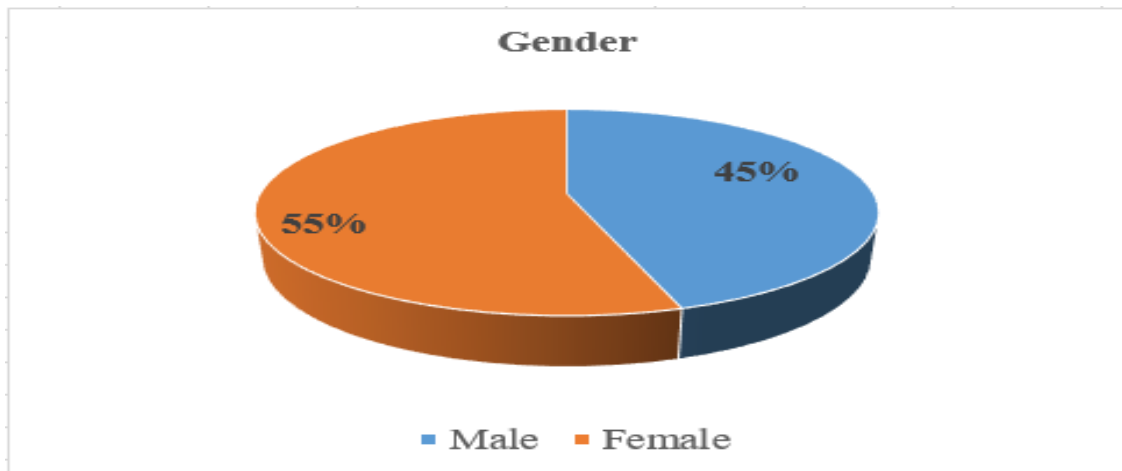


Figure 3

Years of Experience

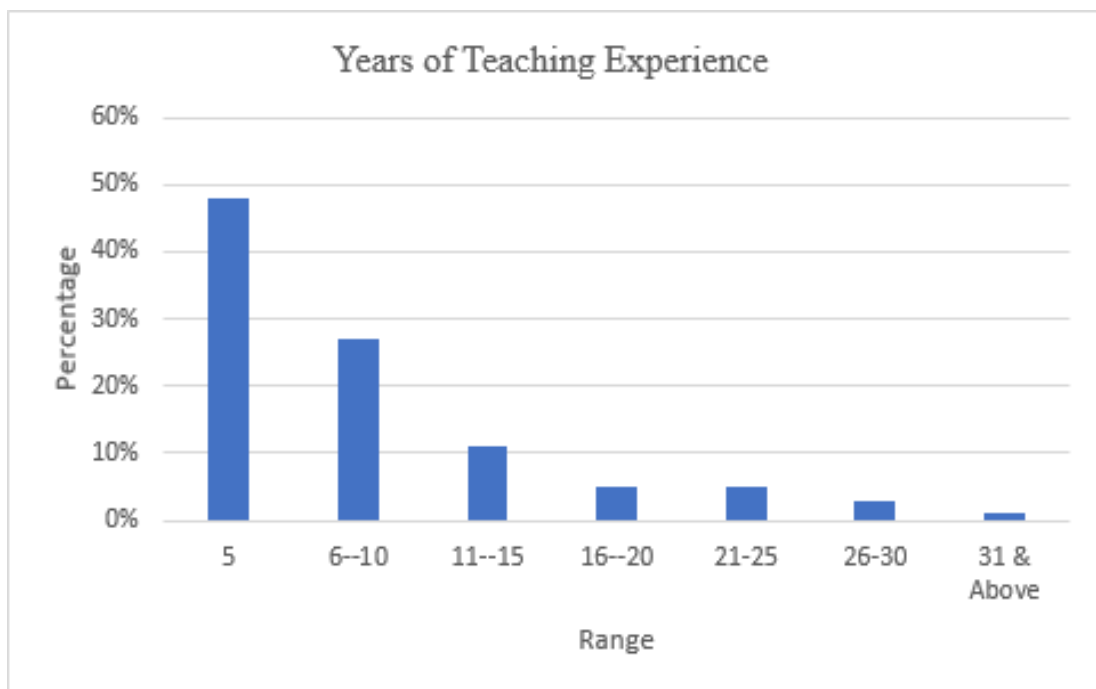
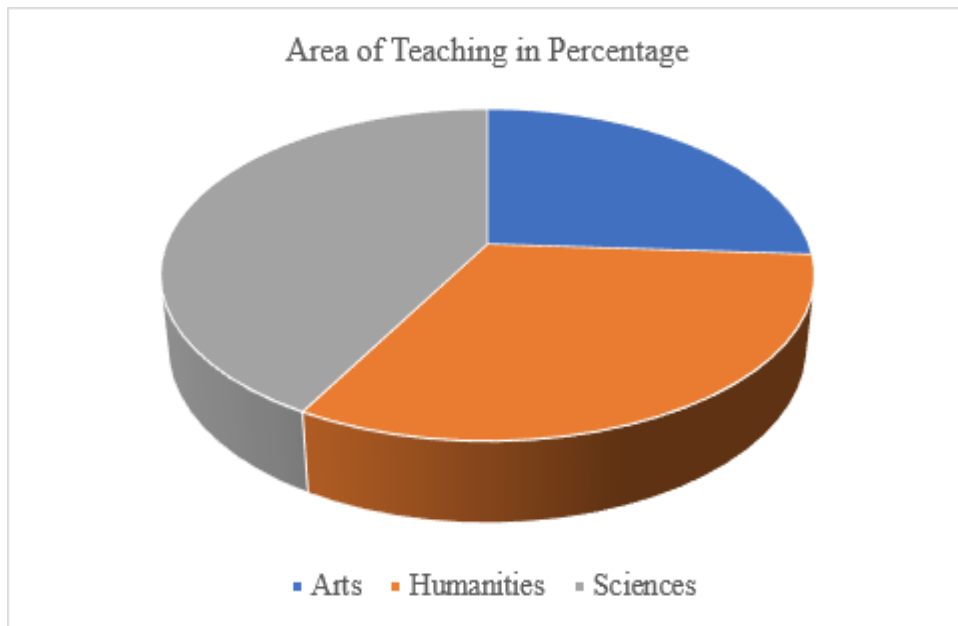


Figure 4
Area of Teaching



Teachers' Mindsets, Instructional Practices, and Student Achievement

The study's main objective sought answers to the relationship between teachers' mindsets, instructional practices, and student achievement. The study had first to determine the teachers' mindsets and then the relationship to the other variables to attain the answers.

Determination of Teacher's Mindsets

The implicit theory score was calculated by averaging the three items from Dweck's scale. "You have a certain amount of intelligence, and you can't really do much to change it," "Your intelligence is something about you that you can't change very much," "You can learn new things, but you can't really change your basic intelligence." These items were scored on a 6-point Likert-type that ranged from 1 (strongly agree) to 6 (strongly disagree). The mean of the three items was taken, with scores of 4.0 or more

indicating an incremental theory of intelligence and a score of 3.0 or less showing an entity theory (Dweck et al.,1995).

The overall mindset score of the (N=211) surveyed teachers from various district schools was growth mindset (39 percent), fixed mindset (45 percent), and neutral mindset (16 percent). The aggregate mindset score of districts’ school surveyed teachers is shown below.

Table 2

Overall Mindset Score

Fixed	Mixed	Growth
95 (45%)	34 (16%)	82 (39%)
<i>Note.</i> N=211		

Relations Between Teachers’ Mindsets, Instructional Practices, and Students’ Achievement

The second research question and which was the main objective of the study examined the relations between teachers’ mindsets, instructional practices, and students’ achievement. To determine this, structural equation modeling was conducted. Below are the results.

Preliminary Screening Procedures Findings

Normality test. QQ plots were used to test MVN visually. The QQ plot was created for two sets of data: one for STEM disciplines and another for non-STEM courses. According to the QQ plots the data were nearly multivariate normal. The Henze-Zirkler test was also used for the entire data set with the data being subsetted using the teaching subjects as the criteria (STEM and non-STEM). In both cases, it was observed that the data were multivariate normal, with the former test yielding the test statistics (HZ)

(0.9995308, 0.9990867) and corresponding p-values as (0.20252,0.3636613) and the latter test yielding a test statistic of 0.9999983 and p-value 0.07830795. Findings are detailed below.

Figure 4

QQ Plots Findings Representation

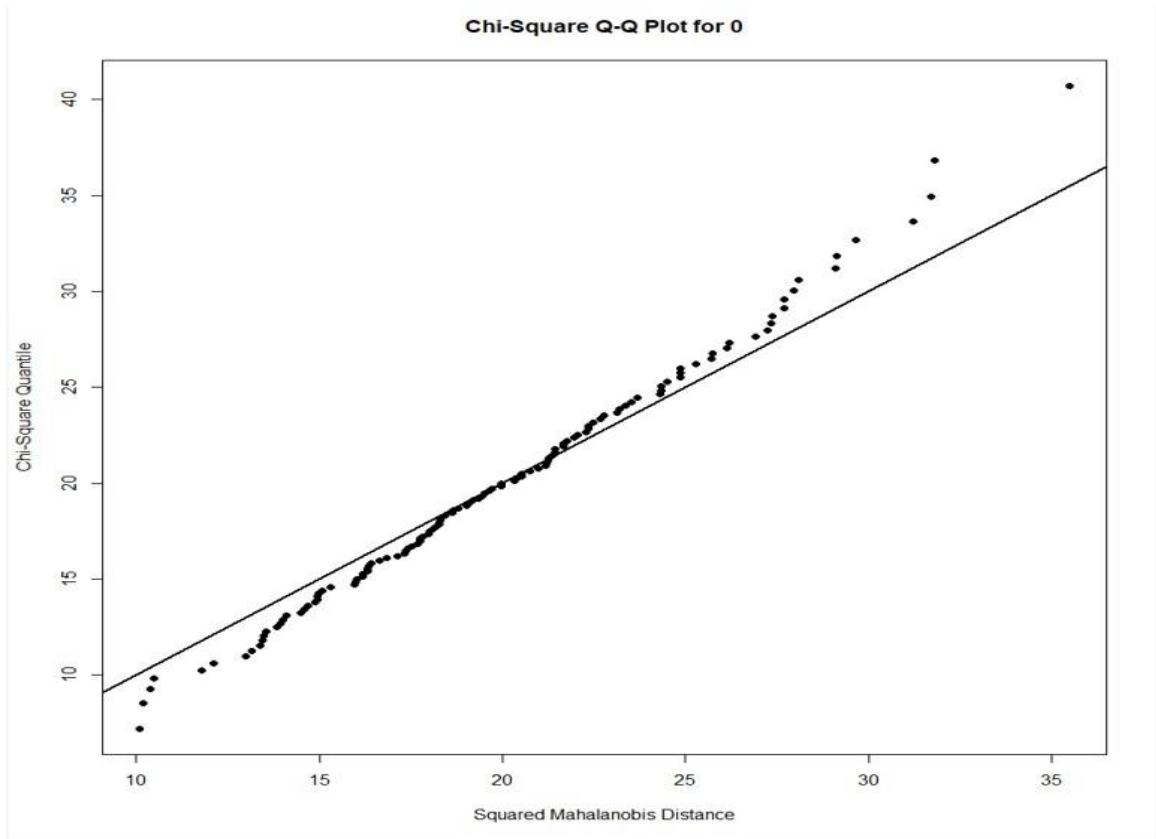


Figure 5

QQ Plots Findings Representation

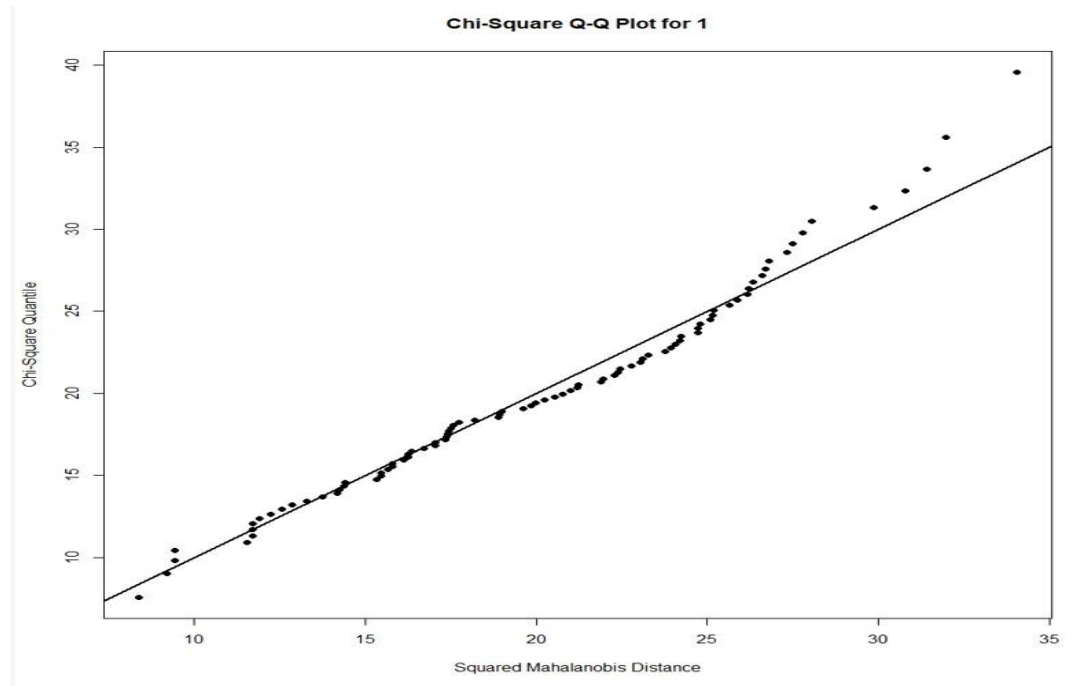


Table 3

Henze-Zirkler Test

Variable	HZ	p value	MVN
Henze-Zirkler	0.9995308	0.20252	YES
Henze-Zirkler	0.9990867	0.3636613	YES
Henze-Zirkler	0.9999983	0.07830795	YES

Factor Analysis

Factor analysis confirmed the correlation between the observed and latent (exogenous) variables. The loadings of MS_1, MS_2 and MS_3 was 0.81, 0.841 and 0.782, respectively. This, coupled with the high reliability, confirmed that the data were suitable for the underlying variable. On the other hand, only IP_3, IP_5, IP_8, and IP_14 had loadings above 0.5, and thus, they are the only ones used in the preceding analysis.

IP_13 had a factor loading of 0.693, but it was identified as belonging to a third latent variable. This third latent variable was not used in the preceding analysis because it has only one measured variable, accounting for about 5% of the variation. The model results show that the teacher mindset accounts for about 13% of the variation while instructional practices account for about 11%. Cumulatively the two stronger constructs account for 24% of the variation. This implies that other variables explain students' achievement, which is not captured by the model fitted in the current study.

Below are the loadings.

Table 4

Factor Loadings

Loadings	Factor1	Factor2	Factor3
SUBJ_CAT			
GENDER	0.148		
EXAM_MEAN		0.245	
T_EXPR		0.204	0.211
MS_1		0.815	0.204
MS_2		0.841	0.122
MS_3		0.782	
IP_1		0.427	
IP_2	0.394		
IP_3	0.584		
IP_4	0.439		0.259
IP_5	0.639		
IP_6	0.120	0.204	-0.109
IP_7	0.192		0.232
IP_8	0.654		
IP_9	0.468		-0.122
IP_10	-0.230	0.116	0.233
IP_11	0.487		0.118
IP_12	0.460		0.472
IP_13	0.155		0.693
IP_14	0.568		0.197

	Factor1	Factor2	Factor3
SS loadings	2.679	2.356	1.095
Proportion Var	0.128	0.112	0.052
Cumulative Var	0.128	0.240	0.292

The squared multiple correlations also indicate the percentage of variation in a latent variable that the model is explaining. The square of the factor loadings gives the multiple correlations for each latent variable. The loadings corresponding to MS_1, MS_2 and MS_3 are 67.6%, 76.4% and 58.6%. The variances are quite high, indicating that the choice of questions and the resulting data is suitable for further analysis. On the other hand, the squared multiple correlations for the selected measurement variables corresponding to instructional practices range from 29.5% (IP_11) to 38.6% (IP_3). The low squared correlations are not necessarily an indicator of a “bad” model but an incomplete one. This is supported by the preliminary factor analysis above, which indicates that about 75% of the expected variation is from variables or factors not captured in the fitted model. Another possible meaning of the low loading is that the available indicators do not fully explain their respective constructs. Identifying and measuring the missing indicators and/or constructs is beyond the scope of the present study.

Measurement Model and Its Assessment

The reliability of the latent variables was measured using Cronbach’s alpha (where values of 0.7 and above indicate good reliability). The path diagram below shows that the standardized regression coefficients for all the selected variables are positively related to their respective latent variables. For example, for the mindset construct, a change of one standard deviation in the variable MS_1 results in 0.822 standard deviations increase in the dependent variable when all the other variables are held constant. This effect is significantly different from zero at the 5% level of significance

(p-value <0.001). Similarly other observed variables are also significant in explaining their respective latent variables. The mindset construct has reliability of (Cronbach's alpha) 0.86. On the other hand, instructional practice (using variables IP_3, IP_5, IP_8, IP_11 and IP_14) has a reliability of (Cronbach's alpha) 0.728. All the variables used in the analysis yield a Cronbach's alpha value of approximately 0.7 (1 dp).

Table 5

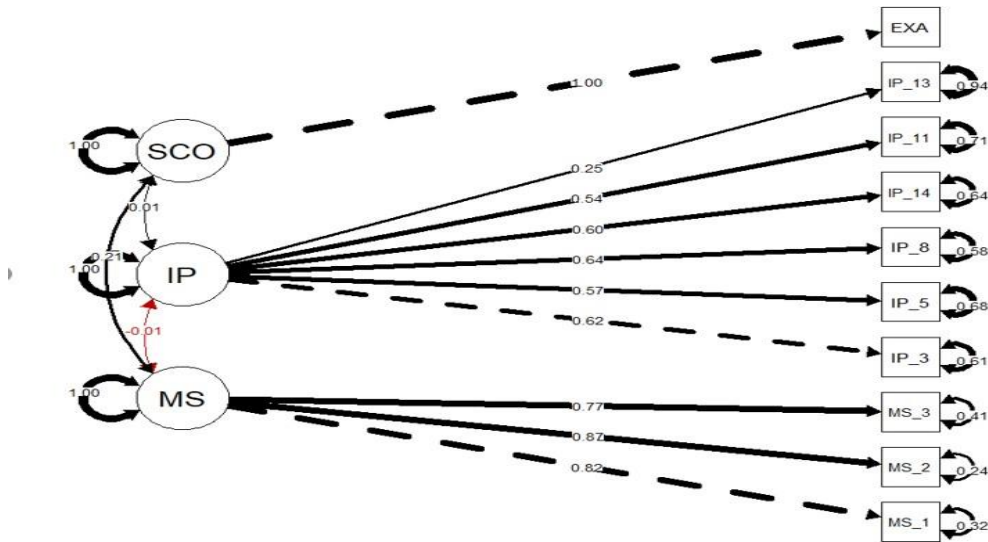
Cronbach's alpha for the 'new_data1.

Items: 3	Sample units	Alpha
3 [, c(10:12)]	211	0.86
5 [, c(15, 17, 20, 23, 26)]	211	0.728
8 [, c(10, 11, 12, 15, 17, 20, 23, 26)]	211	0.657

The path diagram also shows standardized covariances among the latent variables. Surprisingly, there is a negative relationship (0.019) between teacher instructional practices and students' performance. However, this covariance is not significant at the 5% significance level. On the other hand, there is a positive covariance (0.210) between teacher mindset and student performance which is significant at the 5% significance level (p-value 0.006).

Figure 5

Measurement model representation



Testing of the Measurement Model's Fitness

The overall goodness of the model above is measured using the chi-square test and fit indices including the Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA), among others. The objective of this chi-square test of model fit is to quantify the extent to which the model covariance matrix deviates from the sample covariance matrix and to test that deviation against a null hypothesis of zero (i.e., it is not significantly different). We fail to reject the null hypothesis (null hypothesis here represents the researcher's belief that the model is correct) when the p-value is large (say greater than 0.05 at the 5% level of significance). On the other hand, fit indices (e.g., CFI, RMSEA) view model fit as points along a continuum, reflecting "better fit" at one end of the continuum and "poorer fit" at the other. The RMSEA yields values ranging from 0 to 1 and reflects a poorer fit as its value increases. The CFI, in contrast, is an index of "good fit," ranging from 0 to 1, which quantifies the proportional improvement in structural

equation model fit over a “null” model. A model with CFI greater than 0.95 and RMSEA less than 0.05 is considered a good fit. The chi-square statistic from the analysis is 15.651 (degrees of freedom=25) and a p-value of 0.925. This means we have insufficient evidence to reject the fitted model in favor of the saturated model. This is confirmed by an RMSEA value less than 0.0001 and a CFI greater than 0.999.

In conclusion, our measurement model appears to be well defined. This paves the way for us to proceed and seek to predict the effect of the exogenous latent variables on the endogenous latent variable- this is done using the SEM.

Table 6

Holzinger Swineford CFA

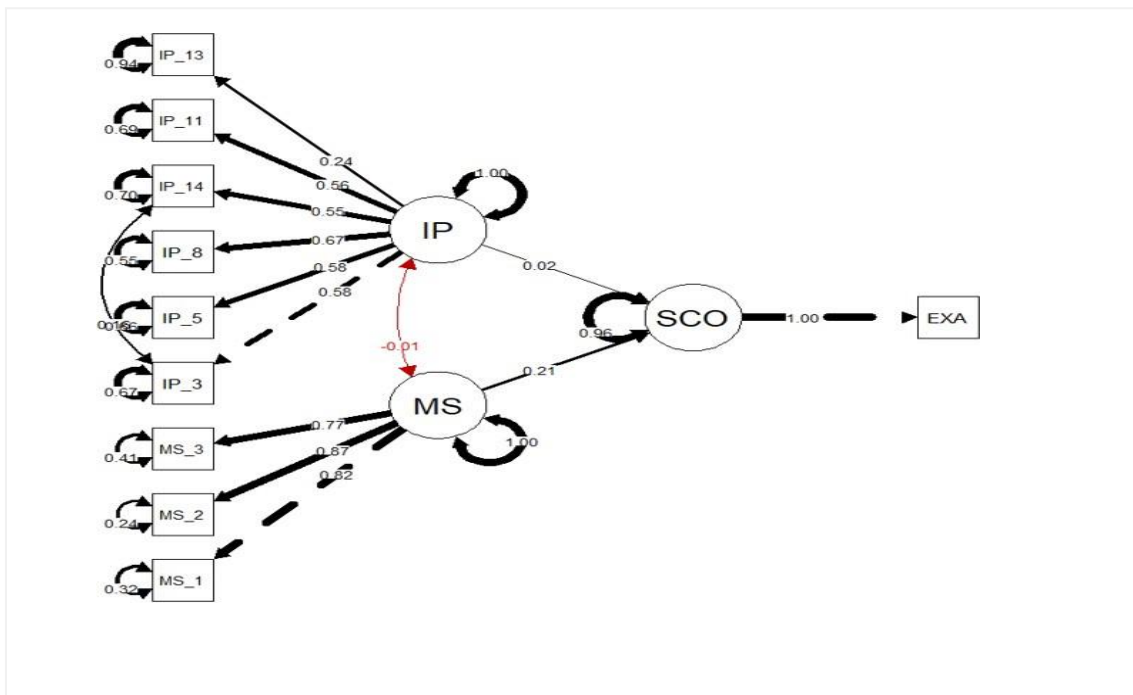
		Estimate(Std.Err.)		
Factor Loadings				
MS	MS_1			
	MS_2	0.99	0.08	0.000
	MS_3	0.91	0.08	0.000
IP	IP_3			
	IP_5	0.97	0.16	0.000
	IP_8	1.13	0.17	0.000
	IP_11	1.07	0.18	0.000
	IP_14	0.91	0.15	0.000
		Fit Indices		
	χ^2 (df)	36		0.000
	CFI	1.00		
	TLI	1.03		
	RMSEA	0.00		
+Fixed parameter				
* n<0 001				

Structural Model

Assessment of the structural model. Findings show that the fitted model yields a chi-square statistic of 11.908 with a p-value of 0.981 at 24 degrees of freedom. This is confirmed by CFI greater than 0.999 (3 dp) and RMSEA value less than 0.001 (4 dp). Thus, we fail to reject the fitted model in favour of the baseline model.

Figure 6

Structural model Representation



Having confirmed that the model fits well, we go ahead and interpret the regression coefficients. We notice that instructional practices are not significant in predicting students' achievement. This possibly results from the lower loadings of the measurement variables, as observed earlier. On the other hand, the teacher mindset is highly significant in predicting students' performance. The standardized regression coefficient indicates that a change of one standard deviation in the latent variable mindset

results in a 0.210 standard deviation increase in the latent dependent variable (student performance/achievement) when all the other (latent) variables are held constant. The model shows non-significant covariance (or correlation) between the two exogenous latent variables: teacher mindset and instructional practices.

Table 7

Holzinger Swineford CFA

Model		Estimate	Std.Err	P
Factor Loadings				
MS	MS_1			1.351
	MS_2	0.99	0.08	0.000
	MS_3	0.92	0.08	0.000
IP	IP_3			0.415
	IP_5	0.97	0.16	0.000
	IP_8	1.13	0.17	0.000
	IP_11	1.07	0.18	0.000
	IP_14	0.91	0.15	0.000
Fit Indices				
	χ^2 (df)	24		0.000
	CFI	1.00		
	TLI	1.03		
	RMSEA	0.00		
+Fixed parameter				
* p<0.001				

Qualitative Strand Findings

Introduction

Data from the qualitative stage of this study was designed to provide additional insight and further explain the quantitative results. This section report on those insights. A sample of 9 participants was selected from those who provided data in the quantitative part of the study. These 9 participants were selected with different mindsets as reflected

in the survey results (3 fixed, three mixed, and three growth). For easy identification these teachers are named with their mindset first letter and number i.e., growth (G1-G3) Fixed (F1-F3) mixed (M1-M3). The main guiding research question was: how do teachers explain/justify their mindsets regarding their conception of their students' abilities or intelligence as reflected in and associated with their self-reported instructional practices? In the interview, the participants were probed to share their views regarding their definitions of intelligence and their expectations for their learners in relation to their mindsets. The other interview questions delved deeper into teachers' mindsets' relationships to classroom practice. Detailed below are the teachers' responses providing insights into their mindsets and their relation to their instructional practices.

Teachers' Mindsets

The first two questions of the interview elicited teachers' definitions of intelligence and beliefs they hold in regard to intelligence and the perceptions surrounding the expectations of students. As detailed below, the nuances in their responses gave insights into their mindsets.

Definitions of Intelligence

Teachers' responses to their definitions and perceptions of intelligence included the keywords reasoning, learning, understanding, problem-solving, and acquiring and applying knowledge. There was agreement in their stated definitions that transcended differences in their mindsets. These agreements included the description of intelligence as an ability to learn and reason, as evident from most teachers' (n=5) responses in all mindset groups. However, teachers also had other descriptions of intelligence and these descriptions differed among all mindset groups.

Growth mindset teachers stated that intelligence was not only an ability to learn, but was also related to solving problems, processing information, and thinking critically, as one of the teachers affirmed: "Intelligence is the ability to reason, solve problems, and think critically" (G1). Similarly, the mixed mindsets also viewed intelligence as the ability to understand and process or interpret what is learned. Lastly the fixed mindsets also considered intelligence as the ability to acquire knowledge, perform tasks, and retain and recall concepts. One of the teachers responded, "Intelligence is a student's ability to retain content and recall concepts and probably to respond to questions" (F1).

In defining intelligence, participants also mentioned some characteristics that constitute intelligence. These include the malleability of intelligence and the fact that intelligence is both learned and innate. These characteristics, as indicated by the participants, are reported below.

Intelligence as Malleable. Teacher responses showed that they believed intelligence was malleable. Seven of the nine teachers responded that it could be changed and the only two who did not believe intelligence was changeable held a fixed mindset. Notably, even the teachers who did not believe intelligence was changeable described it as "difficult and not impossible" said one of the fixed mindset teachers (F2).

The teachers further mentioned how intelligence could be developed. The growth mindset teachers suggested that it can be developed, and that this development depended on how students were taught, the effort and compatibility of the learning style of the student and teacher, and the home environment. "Intelligence can be developed and especially in an environment that supports learning and growth," one growth teacher suggested. As for the teachers with mixed mindsets, they noted that intelligence could be developed or changed through practice and the right teaching style; as one of the teachers

said, Intelligence can also be changed through learning, practice, and hard work. Helping students explore their strengths and use them better can really improve their innate intelligence. An appropriate teaching style is also helpful." Only a single teacher in fixed mindset group considered intelligence malleable. In his response, he noted, "Intelligence is learnable and perhaps can be developed by teaching more, offering more courses and varied content, and teaching different aspects rather than just teaching it in one way."

Intelligence is Innate and Learned. Another characteristic of intelligence that emerged from teachers' responses was their view that intelligence is both innate and learned. When talking about the nature of intelligence in terms of its innateness most teachers (n=7) gave growth mindset responses by stating that it is learnt and mixed mindset responses (innate and learnt). Those who stated that intelligence is learned represented all groups of mindsets and included one teacher with a growth mindset, two teachers from mixed mindsets and one teacher with fixed mindset. The teacher with the growth-oriented mindset stated, "Intelligence can be learned and developed, especially in an environment that supports learning and growth." The two teachers with mixed mindsets also indicated that intelligence can only be learned, as indicated by the responses of one of them, "I believe that intelligence is learned and perhaps developed through more instruction, more courses and varied content, and teaching different aspects as opposed to one-sided instruction" (M2). The last teacher (with fixed mindset) also answered, "I can say that intelligence is learned and basically more practice with students can lead to a student developing intelligence."

Teachers who believed that intelligence can both be learnt and is innate included two growth-mindset teachers and one mixed-mindset teacher. One of the growth mindset teachers pointed out that intelligence is innate but also learned as one grows, "I think you

are born with a certain amount of intelligence, first of all. Intelligence grows as you learn new things." The teacher with the mixed mindset responded that intelligence can be changed through "learning", practice, and hard work, which can improve the intelligence one is "born" with.

The teachers who indicated that intelligence cannot be learned were both of the fixed mindset group. These teachers pointed to the innate nature of intelligence, and some even reported that even if changed, this change remains limited. One of these teachers replied, "I also believe that you are born intelligent or not. Genes play a big role in this, and therefore improvement is possible only up to a certain point".

Teacher's Mindsets and their Student Performance Expectations. Teachers were probed to reflect on their views about the relationship between student performance and their intelligence as a way to uncover their mindsets. When asked about the difference between students who perform well and those who seem to perform poorly, all of the teachers with the growth mindset attributed changes in student performances to other factors such as teaching style, students' social background, motivation, and student effort to differences in achievement among students rather than to their aptitude or intelligence, as evidenced by the response of one growth mindset teacher, "I do not think high-performing students are a matter of intelligence. Internal and external factors such as intrinsic motivation, the way teachers teach, and student effort determine their performance." (G1).

However, teachers with mixed and fixed mindsets, attributed students' performance solely to their intelligence or giftedness with the exception of two teachers one with mixed and another with fixed mindset suggested that apart from intelligence being connected to learners' performance it was also connected to their home

environment or background. group. One teacher responded, "Those who perform well are smarter and learn faster than the low-performing students, who tend to be less active in class. Their social background also contributes to their performance." (F1).

Teachers' Mindsets and Practices

The last questions of the interview (3-5) were related to the role of teacher mindsets in lesson planning and their practice. The open-ended nature of the questions prompted teachers to comment on whether there was a relationship between teachers' mindsets and their instructional planning and practice. Teachers' responses are provided below.

Role of Teacher Mindsets in Instructional Practices Considerations. When asked if their beliefs about learner intelligence played a role in lesson planning, all teachers in all groups (n=8) indicated that they considered their beliefs about learner intelligence in lesson planning and in choosing their instructional practices. In their responses one of the growth mindsets teachers indicated that their perceived learner intelligence and ability (mindset) played a central role in their planning when it came to what and how to teach, as one of these teachers put it, "Intelligence is a consideration I make when preparing my lessons because learners do not learn at the same rate" (G1). This teacher also notes that his teaching style also changes depending on the learners, and he uses different teaching approaches for the learners: "Even if we consider fast and slow learners, you cannot use the same method for both. For this reason, my teaching approaches will be different". Similarly, another mixed-minded mindset teacher (M2) responded by saying that "When planning lessons, I take into account the intelligence of my students, because you cannot teach everyone the same way." He goes on to say that his instructional practices are primarily guided by the perceived intelligence of the

learners, whether it is in his choice of teaching methods or in supporting individual student learning. "As a teacher, you know you have different students who have different learning abilities at the same time. So, I think the choice of teaching methods depends on their intelligence. We try to give more challenging tasks and questions to the fast learners who understand the concepts very quickly, while at the same time we ask simple questions or questions appropriate to their level to the slow learners," he adds. Another teacher with a fixed mindset (F3) also stated that intelligence was the most important factor in lesson planning and practice, "The intelligence of the learners is the most important thing I consider when planning lessons."

The only teacher who indicated that she did not plan, and practice based on her mindset was of fixed mindset. In her response she stated, "I do not think my perception of student intelligence influences my choice of instructional methods" (F2).

Other Considerations Influencing Teachers' Practices and Planning.

Although all (n=8) but one of the teachers indicated that perceived learner intelligence played an important role in their planning and practice, six of these teachers also indicated in their responses that other factors also influenced their practice and played an important role. Qualitative analysis of the interview data revealed that teachers with growth mindset and mixed mindset included factors such as the mandated syllabus/curriculum, school and parent expectations, learners social background, and grade expectations in their planning and instructional practice in addition to perceived learner intelligence. Only one fixed mindset teacher (F2) also considered other factors as influencing their planning apart from intelligence.

The considerations that emerged from the interviews' data encompassed teaching approaches and learning styles as mentioned by three teachers all of whom were of growth

mindsets (G1, G2 and G3), the mandated syllabus/curriculum and learning materials as mentioned by 3 teachers both fixed and growth mindsets (F2, G3 and G2), expectations from parents, the school, and pressures of standardized tests and grades (M3) and finally learners background (M1).

Teachers with a growth mindset consistently cited appropriate teaching methods and student learning styles as other considerations when choosing specific instructional practices. One of the teachers with a growth mindset said, "Some of the things I consider when preparing a lesson are different teaching methods and my students' learning abilities" (G1). The mandated curriculum and syllabus were other factors that teachers from growth mentioned as important in their considerations for planning and practice. Teacher G3 said, "The materials that we use for teaching also have guidelines that we have to follow. I mean the curriculum, so that is also something that I consider when planning my lessons" (G3).

Teachers with mixed mindsets indicated that the expectations and pressures of the system, which emphasizes the value and importance of grades over learning, as well as school administrators and parents, played an important role in planning or deciding on instructional practices. This teacher noted, "Our system puts a lot of emphasis on grades. Parents often want their children to do well. I have to teach the students the material and get them to master the content, especially with the low-performing students". Another mixed mindset teacher also indicated other factors they consider when planning their instructional practices. These include the social background of the students and the past performance of the students. "We should also consider the learners' social, cultural, and economic backgrounds because these also affect how well learners learn" this teacher suggested.

Teachers from the fixed mindset group reported that they give most of the consideration to the syllabus rather than to intelligence because the syllabus already provided guidelines on the instructional practices to follow, and therefore this was taken into account in lesson planning, "I do not think my perception of student intelligence influences my choice of instructional practices. You see we already have those practices for instruction laid out in the curriculum".

Summary

This chapter presented the results for both the quantitative and qualitative strands of the study. According to the research question, the results of the quantitative part included teachers' mindsets and the relationship between these mindsets, instructional practices and students' achievement. The results showed that the teachers' mindset in the context of this study was distributed as follows: growth mindset (39 percent), fixed mindset (45 percent), and neutral mindset (16 percent). Next, correlation results were obtained through structural equation modeling. The results showed that teacher mindset was highly significant in predicting student achievement. The covariance between the mindset and student performance was (0.647), which is positive and significantly different from zero (p-value 0.006). The results also show that there is no relationship between teachers' mindset and their instructional practices. The covariance between these two variables was (-0.005), which is not significantly different from zero (p-value 0.914).

Finally, a positive but non-significant relationship was found between teachers' instructional practices and students' achievement. The covariance between the instructional practices and student achievement is positive at (0.019), but not significant.

The second part was the presentation of the qualitative results. The purpose of seeking qualitative data was to provide deeper insights into the quantitative results

through a qualitative analysis of responses to questions that asked for additional information. The findings included insights into teachers' mindsets and teacher practices. Findings on teachers' mindsets included teachers' definitions of intelligence and their expectations of their learners in terms of their mindsets. Two findings emerged in their definitions: first, the malleability of intelligence and intelligence as innate and learned. Regarding their expectations of learners, it was found that teachers with a growth mindset have high expectations of their learners and attribute their performance to other factors, while those with a fixed mindset and a mixed mindset have low expectations and attribute learners' performance to their intelligence or giftedness. Two insights emerged in teachers' mindsets and practices. One was the use of teachers' mindsets in instructional decisions and practices and the consideration of other factors (syllabus/curriculum, school and parental expectations, learners' social background, standardized grade expectations, teaching and learning styles, and learning materials) in planning and instructional practices.

CHAPTER 5

DISCUSSIONS, CONCLUSIONS, RECOMMENDATIONS

Introduction

This study's main objective was to examine the relationships between teachers' mindsets, instructional practices, and student achievement in high and low performing district schools in Nairobi County, Kenya. Using a sequential explanatory mixed-methods study design quantitative results were used to select interview participants and qualitative data was aimed to provide additional clarity of the quantitative results. In the first phase, quantitative research questions addressed teachers' mindsets and the relationship between those mindsets, instructional practices, and student achievement. In the second phase, qualitative, semi-structured interviews explored teachers' perceptions of their students' abilities or intelligence as reflected in and related to their self-reported instructional practices. The data were linked when the qualitative participants were identified from the data collected in the quantitative portion of the study. A second point of connection emerged after the qualitative data were collected and analyzed, and this point of connection serves as the basis for the broader interpretation discussed in this chapter.

Two research questions guided this study. The first research question was quantitative in nature and included a sub-question. Data were collected using a quantitative survey and analyzed using Excel and "R". Quantitative data analysis allowed the researcher to determine teachers' mindsets and the relationships between those mindsets, instructional practices, and student achievement.

The quantitative questionnaire consisted of two components. The first component was the Theories of Intelligence scale (Dweck & Leggett, 1988; Dweck, Chiu & Hong, 1995). This scale is used to assess the nature of one's beliefs about intelligence and ability

(mindsets). Lower scores represented entity theorists and higher scores represented incremental theorists. The second component of the questionnaire was the Instructional Practices Survey (researcher made). This survey was a quantitative measure of teachers' instructional practices designed to determine whether teachers' practices were consistent with a growth mindset, or a fixed mindset based on five themes from the literature. The themes include: (1) Supporting individual student progress, (2) Promoting mastery orientation, (3) Promoting persistence, (4) Promoting student process-oriented thinking (Ronkainen et al., 2018 & Rissanen et al. 2018).

The second research question was mostly answered through qualitative data. Data were collected from participants who were purposefully selected from the results of the quantitative data to represent the three categories of mindsets: fixed, mixed and growth. In the qualitative section, the researcher conducted semi-structured interviews with the nine participants who exhibited different mindsets. The data were analyzed using thematic analysis, from which three themes emerged. The themes and associated quotes provide further insight into the relationship between teacher's mindsets and instructional practices and the impact on student achievement.

The results of this second research question allowed the researcher to combine the quantitative and qualitative results. In what follows, the results obtained will be synthesized to explain and understand the research questions that guided the study:

1. What are the mindsets of teachers in different Kenyan county schools in Nairobi County?
2. Is there a relationship between teachers' mindsets, instructional practices, and student achievement?

3. How do teachers explain/rationalize their mindsets in terms of their view of their students' abilities or intelligence as reflected in and related to their self-reported instructional practices?

Although the data were collected and analyzed separately, the results of the quantitative and qualitative methods form the basis for the discussion and conclusions drawn, as these two methods inform and support each other. The remainder of this chapter combines the two types of data to provide a holistic presentation of the data while highlighting implications for practice and future research.

Discussion

Overall, the study results provided answers to the question on the nature and distribution of teacher mindsets in the district schools under study. The relationship between these mindsets, teachers' instructional practices and student achievement was considered. The discussion follows this sequence as outlined next.

What Are the Teachers' Mindsets?

The findings reflect teachers in district schools in Kenya have a relatively lower growth mindset compared to other findings in the literature. This was evident in their survey results, which showed a value (39 %), fixed mindset (45 %), and neutral mindset (16%). Dweck et al. (1995) suggest that in the general population, about 42.5% of people have a growth-oriented mindset, 42.5% have a fixed mindset, and 15% have a neutral mindset. Thus far, the differences in mindset as seen in this study deviating from the norm of expectations of mindsets to range around the general population as postulated by Dweck et al. (1995) collaborate and affirm that mindsets are context bound can vary from one context to another, which is supported by (Dweck 2012) and other few studies. These studies have been conducted in Western cultures (Dweck and Leggett, 1988; Jonsson and

Beach, 2012) as well as in Asia and in Eastern cultures. This affirms that the case of variation also applies to this context (Africa). These studies have specifically noted that variability is due to factors such as cognitive styles (analytic vs. holistic), social orientation (independence vs. interdependence), values (individualism vs. collectivism), and motivation (self-improvement vs. self-criticism) (Nisbett et al., 2001). In the African context, and particularly in the context of this study, there is little research on this, and this investigation is not within the scope of the current study however the researcher attributes this difference to be likely to the same factors mentioned above.

In parallel with these differences in mindsets in this context, some studies have questioned whether survey-based responses from individual teachers are a reliable approach to gaining insights into mindset. In the interviews comparing the intelligences of high-performing and low-performing students, teachers with a growth mindset set high expectations for their students and attributed student achievement to factors that can be manipulated for improvement, while teachers with a mixed and fixed mindsets set low expectations for their students and attributed student achievement to giftedness. Sun (2015) examined instructional practices in low- and high-performing classes, respectively, and found that teachers' beliefs were significantly more correlated with their expectations for students. Given teachers' qualitative responses on the mindset's we can conclude that the survey reflects actual mindsets quite well, and we can therefore consider the survey to be a good tool for predicting teachers' mindsets.

The Relationship Between Teachers' Mindsets Instructional Practices and Student Achievement

The second part of this study examined the relationship between teachers' mindsets, their instructional practices, and student achievement. Consistent with the study

hypothesis, the correlations showed that teachers' mindset had a highly significant effect on student achievement, while instructional practices had a positive but not significant effect on student achievement. However, there was no correlation between teachers' mindset and their instructional practices.

In this case, the statistically significant relationship between teachers' mindsets and student achievement suggests that teachers' mindsets in the study are highly associated with student achievement. Findings showed that teachers with a growth mindset students scored high on standardized tests, while teachers with a fixed mindset students scored low. Although the literature review points out that teacher mindset is related to student achievement remains controversial (Donohoe et al., 2012), this finding supports most previous work by researchers on mindset that have shown there may be a relationship (Canning et al., 2019). This finding also supports findings from other studies that have shown that teacher mindset has a large impact on student achievement and may be one of the most important aspects when it comes to student achievement as supported by (Donohoo, Hattie, & Eells, 2018; Hattie & Zierer, 2017). Because of this significant relationship, there is a further need to investigate how mindset implicit messages are communicated to learners and influence their achievement.

On the other hand, in this study quantitative results have shown a lack of correlation between teachers' mindset and their instructional practices, this result is at odds with many studies in the literature. Review of the literature has identified studies whose findings offer support for a strong relationship between teachers' mindsets and their instructional practices (Muis & Foy, 2010; Pajares, 1992), while others contradict this viewpoint. From this study however it is clear that the relationship between teachers' mindsets and their instructional practices is not always clear cut. Despite the quantitative

findings indicating that there is no relation the qualitative finding showed otherwise. What emerged from the qualitative findings of this study indicates that teachers' mindsets are central to their instructional planning and practice indicative of existence of the relationship, but that other factors besides mindsets may play a major role and override the effect of mindsets on their instructional practice. The findings further indicate that these factors are external and mostly emanating from the need of teachers to conform to certain pressures within the system/learning environment, such as the demands of school administrators, parents, standardized testing pressures, and even curriculum. Teachers' adherence or conformity to these factors despite their mindset might explain the results as they could, limit teachers' autonomy and lead to extensive non-dependence on their mindset when it comes to making instructional decisions or using certain instructional practices so that there is no correlation between their mindset and their practices. This influence of school climate and organizational culture (administrative pressures and expectations) on the interaction between teacher beliefs and practice should be a key note consideration in future studies to determine the nature of the interaction and the impact on learner achievement.

Lastly, the positive but non-significant relation correlations found between instructional practices and student achievement also offered some important clues for understanding this relationship. The instructional practices used in this study were based on growth mindset pedagogy, which has been reported to have a positive impact on learning (Sahagun, Moser, Shomaker, & Fortier 2021; Schmidt et al., 2015). However, the extent of the impact on students has not been sufficiently explored and the findings remain partially ambiguous. One study that may contribute to our understanding here is that of Park, Tsukyama, Gunderson, Levine, and Beilock (2016). Park, et.al, (2016) using

teachers that actualized growth mindset pedagogy in their classroom examined the motivational framework and mathematics achievement of first- and second-grade students and found that these were particularly related to teachers' reported mastery-oriented classroom atmosphere (a growth-mindset instructional practice) and teacher mindset. This study shows that a particular instructional practice is important in explaining student achievement. Could this mean that different individual instructional practices have varying degrees of impact on student achievement and thus influence the overall effect?

Another possible explanation could be the fact that some of the indicators of the instructional practices in this study had low loadings and did not fully explain the construct in question (instructional practices), which could have attenuated the observed associations. Identifying and measuring the missing indicators for this construct should be a case for further research and improvement of the Instructional Practices Scale. In addition, the specific correlations between each instructional practice and student achievement also need to be explored to ensure that the implementation and application of the growth mindset pedagogy on which the instructional practices examined in this study are based will produce significant results.

Another point is that we used a single county-wide standardized test scores in this study. These results do not include information on prior student performance or outcomes, so the data do not fully capture whether student performance was influenced by teachers' extensive use of instructional practices or whether teachers used certain practices to achieve certain outcomes in this specific standardized test, as we saw in the qualitative results that teachers seemed to succumb to the pressures of standardized testing and used practices such as fact drilling. Thus, to demonstrate a significant relationship or not

between instructional practices and student achievement, studies might need to include classroom observation and testing across a period of time.

Conclusion

In this study, we have seen how mindset interacts with teacher practices and student achievement and how per the findings are best suited to mitigate achievement gaps in this context. Results showed that teachers mindsets are important in the prediction of student's achievement. Mindsets have also been reported to be determinants of instructional quality, and high-quality teachers are capable of improving equity by narrowing the gap between high- and low-status students (Darling-Hammond, 2015). However, teachers' mindsets did not relate to teachers' instructional practices. This does not mean that the associations is unimportant but rather points to a critical yet missing link in this context. Thus, the researcher still believes that efforts to provide professional development for teachers need to consider addressing teachers' mindsets to be key basis in their instructional practices. We also found that instructional practices were positively associated with student outcomes, but not significantly, and we explored possible explanations for this association, what this means for practice, and what further steps to consider.

Lastly, to the best of the researcher's knowledge, the full pathways of the relationships examined in this study have not been examined in any other study within the Kenyan education system. However, individual pathways have been examined separately in previous literature from other contexts. In this context, the findings of this study should be viewed as preliminary findings related to this topic and will hopefully stimulate further research.

Recommendations

In this study, it was hypothesized that teachers' mindsets influence teachers' practices, which in turn affect learners' performance. While the results suggest that there is indeed a relationship between these variables, the relationship between mindset and teaching practices was non correlational. More research is needed to understand the impact that teacher mindset has on student achievement and how implicit mindset messages are perceived by learners. It is generally assumed that this is through instructional practices, but the results of the study show that this is not the case. Thus, there are other factors that lead to this influence that should be considered in further research. Another possible future research direction could be to expand the concept of mindset beyond psychological constructs to include culturally and contextually influenced ideational elements that impact educational norms and systems and have implications for creating educational equity.

Further, it is clear from the literature reviewed, the extensive body of educational research and the findings of this study that the correlates of student achievement may vary across contexts, and thus it is unlikely that we will be able to isolate a single practice or factor that alone can solve these problems in terms of improving student achievement and reducing achievement gaps. Hence, policy recommendations cannot depend on a universal knowledge, rather on contextualized studies that generated findings that capture the peculiarities of the sociocultural and organizational context of the educational sector. Consequently, the results of this study are critical in this context to inform and continue attempts to find sustainable solutions. A key point is that teachers need to be introduced to growth mindset interventions that are concurrent with the introduction of growth mindset instructional practices to reap the additional benefits outlined in this study.

APPENDIX A

MINDSET SURVEY INSTRUMENT (MSI)

Theories of Intelligence Scale (Dweck & Leggett, 1988; Dweck, Chiu & Hong, 1995)

Part 1

Using the scale below, please indicate the extent to which you agree or disagree with each of the following statements by checking the column that corresponds to your opinion in the box to the right of each statement.

1. Strongly Agree 2. Agree 3. Mostly Agree 4. Mostly Disagree 5. Disagree 6. Strongly Disagree

Number	Statement	1	2	3	4	5	6
(a)	You have a certain amount of intelligence, and you can't really do much to change it						
(b)	Your intelligence is something about you that you can't change very much						
(c)	You can learn new things, but you can't really change your basic intelligence						

Part 2

INSTRUCTIONAL PRACTICES SURVEY (IPS) (RESEARCHER MADE)

Please tick the most appropriate response regarding your classroom practices

Number	Items	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	Supporting Student's individual learning processes					
01	In my opinion if a student really struggles to learn it is that this is not the area of their strength.					
02	Frequent one on one interaction with students in class is of great importance.					
03	A key consideration in my practice is learning about individual student barriers so I can help them overcome the barriers.					
04	In my class I consistently differentiate instructional activities targeted to students with different learning abilities and recognize the accomplishment of such tasks.					
	Promoting mastery orientation					
05	It is important to provide learners with the opportunity to relearn by examining their mistakes and learning from them.					
06	As a teacher I assist students in determining how their performance compares to that of their peers.					
07	When planning what to teach a significant consideration is what the students already know					
	Building persistence					
08	It is important as a teacher to give value to persistence and effort by learners no matter how small progress the student makes.					
09	I give honest feedback indicating what the learner needs to do to make improvement.					
10	If a student shows no interest or they say they hate a subject I would prefer to let it be and not help the learner have a change of attitude.					
	Fostering students process focused thinking					
11	Above all individual growth of my students is important to me in my class.					
12	I make special effort in my class to highlight students' progress regardless of them performing below grade level.					
13	In my class thinking and reasoning processes are more emphasized than the specific content and answers.					
14	Above all failures, mistakes and challenges are learning opportunities in my class.					

APPENDIX B

INTERVIEW PROTOCOL (IP)

I am interested in your views on students' intelligence and ability and the instructional practices you use in the classroom and why you use them based on your views. There is no right or wrong answer to these questions. Of interest is your opinion and ideas.

1. What are your beliefs regarding intelligence? The term intelligence has many meanings so feel free to use your own definition of intelligence as a basis for these questions.
 - a) How do you define intelligence?
 - b) Do you believe intelligence is malleable and can be developed?
 - c) If yes how can intelligence be developed?
 - d) If no what makes you believe that it cannot be developed?
2. Think about the highest academic achieving student in your classroom; how would you compare that student's intelligence to the intelligence of your lowest academically achieving student in your classroom? Please explain your thinking/rationale
3. When planning for your classes what are some of the things you take into consideration as you get to know your students? Is your perception of student's ability and intelligence a point of consideration? If yes, why? And what measures do you take to collect this information?
4. Does your perception of your student's intelligence or ability guide or influence your choice of teaching and instructional practices? If yes, how? If not, why? I am interested in how you decide on the specific instructional practices and strategies to use in your lessons.
5. Describe as specifically as possible some of the teaching/instructional practices you use in your classes. Also, please explain how these practices might differ or not depending on your beliefs about your students' ability and intelligence.

APPENDIX C

THEMATIC ANALYSIS OF THE OPEN-ENDED QUESTION

Thematic Analysis Framework			
General theme	Subtheme	Codes	Exemplar Phrases
Teacher mindsets	Definitions of intelligence	Ability	<p>Intelligence is the ability reason, solve problems and think critically.</p> <p>Ability to learn and use new knowledge.</p> <p>Ability to learn and grow mentally in how you think and process information.</p> <p>Ability of the brain to reason or the power of reasoning.</p> <p>Ability to understand concepts and probably interpret the concepts learnt.</p> <p>Ability to process what you learn and apply it.</p> <p>Ability of a student to retain content and recall concepts and probably respond to questions.</p> <p>Ability to acquire and apply the knowledge and skills learnt in class.</p> <p>Ability to reason and perform tasks well.</p>
	Intelligence as malleable	<p>Changed</p> <p>Developed</p>	<p>Intelligence can be developed and especially in an environment that supports learning and growth.</p> <p>Intelligence can also be changed through learning, practice, and hard work.</p> <p>Intelligence is learnable and perhaps can be developed by teaching more.</p> <p>Intelligence can be learned and developed, especially in an environment that supports learning and growth.</p> <p>Intelligence is learned and perhaps developed through more instruction.</p> <p>Intelligence is learned and basically more practice with students can lead to a student developing intelligence.</p>
	Innate and learned	Inborn	<p>I think you are born with a certain amount of intelligence, first of all. Intelligence grows as you learn new things.</p> <p>I also believe that you are born intelligent or not. Genes play a big role in this, and therefore improvement is possible only up to a certain point”.</p>

Teacher mindset and practice	Student Performance Expectations	Teaching style, Motivation and student effort	I do not think high-performing students are a matter of intelligence. Internal and external factors such as intrinsic motivation, the way teachers teach, and student effort determine their performance
	Role of Teacher Mindsets in Instructional Practices Considerations	Social background	Social background also contributes to their performance. You can improve the performance of a student who is performing poorly because it could be due to certain factors, such as their social background.
		Intelligence Giftedness	Those who perform well are smarter and learn faster than the low-performing students. Students I consider intelligent have a high IQ, they seem to be brave, perceive the environment better and can learn new things very quickly, unlike those I consider less intelligent or with a low IQ The students who perform well are naturally gifted. They do not have to try as hard as those who do poorly.
		Key considerations	Intelligence is a consideration I make when preparing my lessons because learners do not learn at the same rate. When planning lessons, I take into account the intelligence of my students, because you cannot teach everyone the same way. Even if we consider fast and slow learners, you cannot use the same method for both. For this reason, my teaching approaches will be different. As a teacher, you know you have different students who have different learning abilities at the same time. So, I think the choice of teaching methods depends on their intelligence. The intelligence of the learners is the most important thing I consider when planning lessons. To have a successful lesson in my planning, I have to consider my students' intelligence
Other Considerations Influencing Teachers' Practices and Planning	Teaching approaches and learning styles	Some of the things I consider when preparing a lesson are different teaching methods and my students' learning abilities. When I plan for lessons, I tend to look more on the best ways the learners will understand, what method will be most effective	

		Mandated syllabus/curriculum and learning materials.	The materials that we use for teaching also have guidelines that we have to follow. I mean the curriculum, so that is also something that I consider when planning my lessons I do not think my perception of student intelligence influences my choice of instructional practices. You see we already have those practices for instruction laid out in the curriculum
		Expectations of parents, school administration/ standardized tests and grades pressures	Our system puts a lot of emphasis on grades. Parents often want their children to do well. I have to teach the students the material and get them to master the content, especially with the low-performing students We have limited time, and the administration requires us to cover the extensive curriculum, so you have to take that into account and find easy ways to cover the many things we need to do in a given period of time.
		Learner background.	We should also consider the learners' social, cultural, and economic backgrounds because these also affect how well learners learn And also, their background, their social cultural, economic kind of background, because it also has a hand in all this.

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