EXAMINING EDUCATIONAL MULTI-CORRELATES AT A PRIMARY SCHOOL IN

RWANDA AND THEIR EFFECTS ON STUDENT ACADEMIC ACHIEVEMENT

by

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(Under the Direction of John Dayton)

ABSTRACT

The purpose of this study was to examine, what has been termed for the purposes of this inquiry, "educational multi-correlates" and their impact on academic achievement within a post-genocide private primary school setting in Rwanda. Educational multi-correlates in this study are a series of interrelated variables that influence academic achievement to include child dimensions, home dimensions, and school dimensions. The research participants at the primary school is comprised of 334 students. The population was further codified by ethnicity (Batwa, N = 106, Rwandese, N = 228) and by gender (N = 167) for both male and female. The effects of ethnicity and gender were also examined. This quantitative study used a 44 item survey instrument to explain the impact of educational multi-correlates on student achievement. The survey was centered on three constructs: child dimensions, home dimensions, and school dimensions that influence student achievement. The survey was designed to answer the following research questions: (1) To what extent do specific child dimensions of chores, health, and hunger impact academic achievement within a Rwandan primary school context, (2) To what extent do specific home dimensions of socioeconomic status, parental education, and parental involvement impact academic achievement within a Rwandan primary school context, and (3) To what extent do

specific school dimensions of school resources, grade repetition, and school climate impact academic achievement within a Rwandan primary school context?

Descriptive statistics, correlations, and multiple regressions were used as quantitative methods to determine the strength of relationships between educational variables and student achievement. The quantitative methods used, provide a means to explore the relationships between the multi-correlates and academic achievement.

The results showed that both gender and ethnicity helped explain differences between the educational multi-correlates and student test scores. Within the child dimension construct, gender and ethnicity differences significantly impacted chores, hunger, and health measured against student test scores. Within the home dimension construct, gender and ethnicity variations also significantly influenced parental involvement and socio-economic status when measured against student test scores. Furthermore, gender and ethnicity distinctions significantly impacted grade repetition and school resources when measured against student test scores within the school dimension.

INDEX WORDS: Rwanda, Batwa, historically marginalized people, ethnicity, gender, academic achievement, educational multi-correlates, social capital, genocide, primary education, survey design, and quantitative research.

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DEDICATION

This doctoral dissertation is dedicated to the following people: All my children: Judah, Jacob, and James, my sources of hope and inspiration. My mother, Mrs. Phyllis America Haynes, for her love for me and continued support through my life. My late father, Mr. Lawrence Haynes, for setting my feet on the path of knowledge. The Rwandan people and government for allowing me to witness the rebirth of a nation.

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CHAPTER 1

THE RESEARCH PROBLEM

Background of the Problem

School enrollment has increased dramatically in the 20th century within high-income, middle-income, and low-income countries[1] due to the creation of school systems managed both by centralized and decentralized forms of government (Lagemann, 1997). In the United States (US), during the early 20th century, only 5% of school-aged children attended school. According to the National Center for Educational Statistics (2014), during the 20th century, the enrollment as a percent of population of students 14 to 17 years of age grew from 5.6% to 92% by 1965. In reviewing historical shifts in enrollment, it is important to understand what drove increasing enrollment and retention.

In low-income countries, specifically those in Africa, school access and enrollment have also experienced rapid growth. Prior to the mid-20th century, colonizers established school systems throughout Africa primarily to educate the children of expatriates, missionaries, and military personnel (Heyneman & Jamison, 1980; Walker-Keleher, 2006). As countries began to establish their independence from their European colonizers, they prioritized providing education to African children. "Rapid expansion of educational systems has occurred in developing countries over the past forty years. On average, gross enrollment ratios at the primary level have

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[1] Country wealth has been determined by the World Bank's Gross National Income levels (2013). Low-income countries have a per capita level of up to $1,025; middle-income countries have a per capita level between $1,026 and $12,475; and high-income countries have a per capita level greater than $12,475. For the purposes of this paper, the terms "low-income countries" and "developing countries" were used interchangeably.

increased by about 25%—to around 100%—across developing countries as a whole" (Colclough, Rose, & Tembon, 2000, p. 8). In addition, low-income African countries began to establish ministries of education to draft policies and laws to increase enrollment. (Ssekamwa & Lugumba, 2001).

Policies that established compulsory education for young learners drove the increasing enrollment in government-run schools (Ssekamwa & Lugumba, 2001). From the mid-20th century to the present, African and other developing nations have established school funding mechanisms to allocate resources to plan, construct, and manage primary, secondary, and tertiary schools (Ssekamwa & Lugumba, 2001). In addition, many former colonized African nations sought partnerships with non-governmental organizations (NGOs) and faith-based organizations to increase access and engage in teacher training initiatives including pre-service, in-service, and professional development. The postcolonial historical period marked significant gains in access, school quality, gender parity, teacher training, and emphasis on student achievement (Hayman, 2005; Hilker, 2011; Kabeer, 2003).

Although emancipation from colonial economic, political, and educational control was granted, the increase in enrollment compared to other postcolonial nations was not as expansive nor as rapid (e.g., India). As Heyneman and Jamison (1980) noted, "In Africa 14 out of 37 countries enrolled more than 70 percent of their children at the first level of schooling; in Asia and the Middle East it is 14 out of 22 countries; in Central America it is 6 out of 10; in South America it is 9 out of 10" (p. 206). Despite the gains in enrollment, large disparities have remained in terms of availability of classrooms, school facilities, and teacher quality. Vast socioeconomic differences continued to exist between low-income and high-income countries (World Bank, 2003).

From the postcolonial period to the present, researchers in high-income countries began studying school achievement factors. In the US, various reports including the Coleman Report (Coleman et al., 1966) and the Plowden Report (Peaker, 1971) posited that pre-school influences exceeded the impact of all elements of school quality. Additional studies concluded that there was a relatively weak relationship between overall achievement outcomes and school factors (Heyneman & Loxley, 1983). More recent authors contended that there were two frameworks for studying school effectiveness: studies that looked at instructional inputs and uniform teaching strategies and studies that investigated the socialization that occurs inside and outside schools (e.g., Fuller & Clarke, 1994).

Baker, Goesling, and LeTendre (2002) speculated that by the early 1970s, "School effects research in the Third World has received significant comparative empirical study and so have the roles of international forces of educational expansion" (p. 292). An early review of the literature on school effectiveness conducted in developing countries found that schools and the process of schooling had little impact on achievement when accounting for family background (Heyneman & Loxley, 1983; Simmons & Alexander, 1978). According to Fuller (1987), more than 50 studies have been performed in the subsequent decade on student achievement in developing countries. "Much of this empirical work suggests that the school institution exerts a greater influence on achievement within countries compared to industrialized nations, after accounting for the effect of pupil background" (Fuller, 1987, p. 255). More recent authors argued that research performed in developing countries identified socioeconomic status (SES) and school quality as key determinants in student performance (Baker et al., 2002; Chiu, 2010). These efforts directly led to additional inquiries that suggested child characteristics, home characteristics, and school factors influence

academic achievement in developing nations (Hungi & Thuku, 2010a; Woldehanna, Jones, & Tefera, 2005).

Research on academic achievement in developing nations has relied heavily on empirical data addressing test scores (Hungi & Thuku, 2010b; Lee, Zuze, and Ross, 2005; Smith & Barrett, 2011). The body of work examined schools and school systems in various countries. The literature on student achievement identified numerous educational inputs that impact student test scores. Specific child dimensions, school dimensions, and home dimensions have been reported to directly influence school completion rates and academic achievement in low-income countries (Creemers, 1999; Fuller, 1987; Hungi & Thuku, 2010a; Woldehanna et al., 2005). Although many African countries (in collaboration with the United Nations) have established broader guidelines within the Millennial Development Goals (MDGs) to increase the overall access and opportunity for learning (Hilker, 2011), more research needs to be done on academic achievement to help guide policy and improve the overall quality of education (Walker-Keleher, 2006).

Research on the educational system of the Republic of Rwanda ("the land of a thousand hills") has been largely missing from the educational literature and the discussion on students' school success factors. The paucity of literature on the Rwandan educational system was partly due to Rwanda's postcolonial conflict (Hilker, 2011). An escalation of ethnic tension after the 1962 Rwandan independence from Belgium led to the genocide in Rwanda in 1994 (Country Watch Incorporated, 2012). This tragedy dramatically reduced the ability of the Ministry of Education (MINEDUC) to provide equal educational access and develop strategies to ensure children's schooling success (Hayman, 2005; Schweisfurth, 2006). Despite the levels of economic, political, and human loss, Rwanda post-genocide has made major achievements economically and educationally. "Investments in the infrastructure are openly visible, most

strikingly—though not exclusively—in the capital, Kigali. Outstanding macroeconomic growth rates, low levels of corruption, outstanding achievements in education and health service delivery, clean streets and tight security have seduced *The Economist* to baptize Rwanda as Africa's Singapore" (Schuberth, 2013, p. 79). Beginning in 2000, the Government of Rwanda (GoR) instituted major economic and educational reforms to shape policy and increase both access to and quality of education (Ministry of Education [MINEDUC], 2003a; MINEDUC, 2003b; MINEDUC, 2008; MINEDUC, 2010; Government of Rwanda [GoR], 2000). Despite the gains achieved since 1994 in increasing the overall number of children enrolling in school (MINEDUC, 2011), school quality and approaches to improving student achievement remained an ongoing challenge (Hilker, 2011).

Furthermore, as signs of improvement were evident, Hilker (2011) contended that significant challenges remained in overcoming unequal educational opportunities at the post-primary/post-lower secondary levels and poor educational prospects for the majority beyond the lower secondary level. The need for researchers to examine predictors in academic achievement at the primary school level may highlight factors that can help students reach and exceed national guidelines to matriculate into secondary and tertiary schooling. This study sought to identify specific educational inputs that impacted student achievement at a primary school located in Rwanda. The statistical analysis included an examination of the impact of gender and ethnicity. In addition, the findings revealed implications and discussion points that can inform and influence Rwandan policymakers to positively impact student achievement and school quality.

Statement of the Problem

East Africa comprises primarily Uganda, Tanzania, Kenya, Rwanda, Burundi, and the Democratic Republic of the Congo (DCR) (see figure 1). Research within East Africa in terms of

methodological inquiries looking at academic achievement and school completion rates has been limited to studies conducted in Uganda (Heyneman & Jamison, 1980; Smith & Barrett, 2011), Tanzania (Hardman, Abd-Kadir, & Tibuhinda, 2012; Hungi & Thuku, 2010b; Lee, Zuze, and Ross, 2005), and Kenya (Mukudi, 2003; Otienoh, 2010; Pelini, 2009; Sifuna, 1989).

There have been only three empirical studies investigating academic achievement in Rwanda. Based on a post-genocide data set carried out in Rwanda between 1999 and 2001, de Walque (2009) investigated student achievement and parent educational levels for both adoptive and biological parents. The author concluded that given the recent increase of orphans due to the genocide and HIV, both adoptive and biological mothers had a significant impact on children's academic achievement. In another Rwandan study, Rulinda, Role, and Makewa (2013) examined students' perceptions of academic achievement using five factor ratings, namely, instructional leadership, school climate, school facilities, teachers' effectiveness, and family support. The study was descriptive, and no empirical evidence was presented to examine the relationship between academic achievement and the five factor ratings. The authors concluded that principals did not seem to involve students in decision-making and students were satisfied with school climate and parental support. Lastly, Gatsinzi, Role, and Makewa (2014) examined work- and school-related variables in teacher motivation in Gasabo District, Rwanda. "The results further indicate that in teacher motivation- and school facilities-related variables, only aesthetic and cleanliness significantly correlated with teacher motivation" (p. 262).

None of the aforementioned studies examined the extent to which a series of educational inputs were measured against student test scores as output variables. It is important for researchers to examine a series of educational inputs that can be tied directly to student academic achievement. In addition, researchers can develop models of school improvement that address low-cost solutions

in which school leaders and educational policymakers can implement reform to directly influence instructional best practices.

Figure 1. Map of East Africa

A research study that evaluated educational inputs in Rwanda that utilized a quantitative approach to analyze findings and provide evidenced-based policy recommendations to GoR was missing from the literature. Against the backdrop of the genocide in Rwanda, more research was needed to employ pragmatic methodologies to understand school success factors in countries that have experienced genocide and remained underrepresented in the broader, global educational dialogue. Research looking at academic achievement on genocide survivors dated back to the development and administration of the Ray self-report scale (1979) investigating achievement motivation. Since the development of the Ray Achievement Motivation Scale, there has been a dearth of literature and empirical examinations of child survivors of genocide and academic achievement in Rwanda or other African nations. Suedfeld, Paterson, and Krell (2005) examined the achievement motivation and occupational achievement between Holocaust survivors and a

control group. There were few differences between survivors versus the comparison group. The authors concluded that two points were made in the context of the general lack of important differences between survivors and the comparison group.   Survivors were not trying to overcompensate for the abuses they suffered, and more specifically, levels of success experienced from adult survivors were clear evidence of resilience and the indomitability of the human spirit.

> "There was a significant interaction between survivor status and age: older survivors and older comparison subjects scored almost the same on the Ray scale, whereas child survivors scored lower, and child comparison subjects higher, than their adult counterparts, $F(1,174) = 4.13$, $p < 0.05$. The difference between child survivors and child comparison subjects was significant, $t(113) = 3.11$, $p = 0.002$. There were no other significant effects involving survivor status." (Suedfeld et al., 2005, p. 248)

The Government of Rwanda and more specifically, the Ministry of Education (MINEDUC), has expressed interest in understanding the characteristics that improve student learning. These entities have developed nationwide reforms and policies to address more fundamental approaches to ensure that gender parity and equal access to schools were reached (GoR, 2000; MINEDUC, 2003a; MINEDUC, 2003b). The evolution of Rwandan educational policy post-genocide has concentrated initiatives to ensure more schools were built and more children received education (Hilker, 2011). Unfortunately, MINEDUC lacked the resources to adequately collect data on school performance within private and non-government schools to direct and inform student achievement practices or instructional pedagogy. A quantitative research study that examined a series of factors that impact student academic achievement in a Rwandan

primary school may add to the discussion on methodologies that can improve schools and student achievement in Rwanda.

There has been a concerted effort by MINEDUC to increase access to compulsory education for Rwandan children. The existing educational system was based on what was described as a 6-3-3-4 format. At the time of the this paper, the Rwandan school structure consisted of six years of primary education, three years of lower secondary schooling, three years of upper secondary schooling, and four years of tertiary schooling (MINEDUC, 2008). The official age for entering primary school was 7 years old (World Bank, 2003). In 2003, the Ministry of Education developed the Education Sector Policy (ESP) to directly govern and administer education practices within Rwanda. The education sector policy was guided by Vision 2020 and the Poverty Reduction Strategy Paper (Hayman, 2005). As this Education Sector Policy (ESP) was being developed, Sub Sector policies were also being developed. These included Basic Education policy, Secondary Education policy, and Higher Education and Scientific Research policy (MINEDUC, 2003a). The development of the ESP and subsequent educational policies can be described as the birth of contemporary education policy and practice. Until 2003, all education-related policies were based on overarching long-term goals. The ESP was designed to formally identify collaborative goals as prescribed within the Vision 2020, Poverty Reduction Strategy Paper (PRSP), and MDG initiatives to coalesce a systemic framework for strategic implementation. The strategies were published in the Education Sector Strategic Plan (ESSP) of 2003.

MINEDUC, since its first publication of the Education Sector Strategic Plan of 2003, has produced intermittent versions until the current ESSP 2010-2015. Each version was guided by the 2003 Education Sector Policy and reflected the government's Vision 2020 and the Economic

Development and Poverty Reduction Strategy (MINEDUC, 2010). "The ESSP provides a good balance between basic and post-basic levels of the system and between equity and labor market considerations and recognizes the trade-offs involved in driving towards its twin priorities of 9 years of basic education and enhanced post-basic education" (MINEDUC, 2010, p.1). The ESSP established education objectives and policy targets. A summary of the policy targets (ESSP 2008-2012) are below:

❖ Primary completion rate increased from 52% in 2006 to 112% by 2015[2]

❖ Drop-out rate reduced from 15% in 2006 to 5% by 2010 and 2% by 2015

❖ Repetition rate reduced from 16% in 2006 to 8% by 2010 and 3% by 2015

❖ Double shifting of teachers reduced from 31% in 2004 to 6% by 2015

❖ Pupil-teacher ratio reduced from 70:1 in 2006 to 45:1 by 2015

❖ A textbook ratio of 1:1 in primary school core subjects by 2008

❖ Gross enrollment rate *tronc commun* from 24% in 2006 to 69% by 2015

❖ Transition rate from primary to *tronc commun* of 75% by 2015.

The ESSP outlined a logical framework that targeted outputs, activities, and indicators to evaluate the plan. There was evidence that the strategies were working. "The Rwandan government's policy of broadening access to education at the primary level has largely succeeded. There was no empirical evidence that access was significantly unequal at this level, on either ethnic, class, or regional grounds" (Hilker, 2011, p. 274). In addition, according to the recent PRSP, the net primary enrollment rate increased from 74% in 2000/01 to 86% in 2005/2006 (Ministry of Finance and Economic Planning [MINECOFIN], 2007), and exceeded 95.6% in 2011

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[2] Completion rate exceeds 100% because of the large numbers of overage children in the schooling system, which also means that the gross enrollment rate has been above 100%.

(MINEDUC, 2011. "Between 2000/01 and 2005/06, the government increased the number of teachers in the secondary sector by 40%, the number of qualified teachers by 45%, and the number of schools by 47%" (MINECOFIN, 2007, p. 23). Another key indicator showed that the completion rate increased from 52% in to 2007 to 78.6% in 2012 (MINEDUC, 2011). Hilker (2011) stated that "the most impressive area of progress has been the rapid growth in enrollment rates, especially at primary level" (p. 272). According to the World Bank (2003), the number of children in primary school had already surpassed the upward trend as forecasted prior to the genocide.

Purpose of Study

According to the Rwandan Educational Statistics Report published in 2012, only 20% of primary school age children matriculated into secondary schools (MINEDUC, 2011). This meant that the vast majority of primary-aged children did not attend secondary school. As noted by Rulinda et al. (2013), schools in Rwanda were under considerable strain to provide access and quality education. The increase of private schools since 1900 established by churches (Perry, 1908) provided an avenue for children to receive quality education. The Rwanda Education Board (REB), which governs educational testing and accreditation for all schools in Rwanda, including private schools, reported that out of the top ten performing students, nine were from private schools (Rwanda Education Board, n.d.). The aim of this study therefore was to examine what has been termed for the purposes of this inquiry, "educational multi-correlates" and their impact on students' academic achievement within a post-genocide private primary school setting in Rwanda. Educational multi-correlates were operationalized as a series of educational interrelated variables that influenced academic achievement, which included child dimensions, home dimensions, and school dimensions. The level of impact of ethnicity and gender were also examined.

This study sought to investigate a compilation of child-, home-, and school-related dimensions that impacted academic achievement in a primary school located in Rwanda. The subsequent chapter on methods discusses and elaborates on the research participants and research site. This study employed quantitative methodologies to investigate relationships between educational multi-correlates and student test scores. This investigation was performed by utilizing descriptive, correlational, and multiple regression analysis tools to frame the methodological context of the study. The research questions were concerned with determining the relationships between academic achievement and educational inputs for student success. The research questions were tested to describe and explain the nature of the relationships between educational multi-correlates and a measure of student achievement.

Furthermore, this research utilized quantitative methods as a means of applying deductive approaches, in which research questions substantiated the variables. The phrasing of the research questions determined how data were collected as well as the method of statistical analysis used to examine the data (Creswell, 2014). "The purpose of quantitative studies is for the researcher to project his or her findings onto the larger population through an objective process. Data collected, often through surveys administered to a sample or subset of the entire population, allow the researcher to generalize or make inferences. Results are interpreted to determine the probability that the conclusions found among the sample can be replicated within the larger population" (Borrego, Douglas, & Amelink, 2009, pg. 54). Based on the evidence presented from the data collected, inferences can be derived from the measure of statistical analysis (Creswell, 2014; Thorne & Giesen, 2002).

The study used quantitative analysis tools to help answer the research questions. Descriptive statistics such as percentages, means, and standard deviations can be performed, to

help describe the phenomenon in question (Huck, 2012). Descriptive statistical techniques were used to summarize data across the independent variables. Pearson correlations were employed to describe the relationships between variables. Correlation coefficients were calculated and displayed in a correlational matrix. The study also utilized multiple regressions to determine predictions and explanations between variables. "A researcher can compare groups of data to determine the probability that differences between them are based on chance, thereby providing evidence for judging the validity of a hypothesis or inference" (Tuckman & Harper, 2012, p. 263). Descriptive statistics, correlation, and multiple regression were used as quantitative methods to determine the relative strength of relationships between educational multi-correlates and student achievement.

The primary instrument to gather data was a Likert scale survey used to elicit participants' responses, attitudes, and beliefs. This survey study was conducted at a primary school located in Rwanda. In addition, school records that included grade books and enrollment records were codified to determine demographic characteristics of the population. The dependent variable for this research was student test scores gleaned from school records. A survey was administered to elicit participant responses on several research constructs that included child dimensions, household dimensions, and school dimensions. In addition, the examination of the data was categorized through the lens of gender and ethnicity.

Several independent variables, including (1) Parental Education Level (PEL), (2) Parental Involvement (PINV), (3) Socioeconomic Status (SES), (4) Student Chore (CHORES), (5) Lack of Food (HUNGER), (6) Child Physical Health (HEALTH), (7) Child Grade Repetition (GREP), (8) School Resources (RESOURCE), and (9) School Climate (CLIMATE) were investigated in this study. The single dependent variable was student test scores. The input variables and research

constructs were used to create and support the research questions. The research questions are listed below:

1. To what extent do specific child dimensions of chores, health, and hunger impact academic achievement within a Rwandan primary school context?

2. To what extent do specific home dimensions of socioeconomic status, parental education, and parental involvement impact academic achievement within a Rwandan primary school context?

3. To what extent do specific school dimensions of school resources, grade repetition, and school climate impact academic achievement within a Rwandan primary school context?

Significance of the Study

The Government of Rwanda has experienced dramatic change as it has tried to provide greater educational opportunities for its people. Although the United Nations has described Rwanda as a model for other developing nations, amidst the backdrop of the 1994 genocide, there remained challenges in regards to poverty reduction, ensuring more children had access to education, and that GoR safeguarded quality education (GoR, 2000). This study sought to provide a body of knowledge to spurn more education research in Rwanda. In addition, as more research is conducted, the implication and impact on educational policy will be germane to further transforming the agricultural economy into an information economy as outlined in the Government of Rwanda Vision 2020 strategic plan.

Specifically in Rwanda, research was needed to inform educational policy to offer strategies to provide quality education. The shortage of educational quality models based on empirical studies was missing in the literature in Rwanda. Furthermore, the literature did not address the contributing factors or correlates that impact academic achievement of students at all

levels of education, including primary, secondary, and tertiary levels. Lastly, there have been virtually no empirical studies that investigated the marginalized people group referred to as Batwa and academic achievement. This was important because a significant percentage of the population of the participants for this study consisted of the Batwa people group. The Rwandan Ministry of Education needed more information and research that addressed low-cost solutions to increasing student performance in order to prepare their students to meet both the United Nation's Millennial Development Goals (MDGs) and national benchmarks. This study examined the collaborative educational multi-correlates that impacted student performance. The conclusions and findings highlighted the need for further research areas that may equip policymakers with information to make better educational policy. Generalizations were applicable to similar, rural private schools within Rwanda.

At the time of the study, a significant segment of the target population at the primary school in Rwanda comprised a micro-tribe called the Batwa. The Batwa make up about one percent of the population in Rwanda, and the Government of Rwanda has classified these people as a "historically marginalized people" (GoR, 2011). The Batwa are an impoverished people group that earn their living by making pottery (Manirakiza, 2013). Since GoR did not recognize these people as a distinct ethnicity in Rwanda, the locals referred to them as potters (Taylor, 2011). There have been no empirical studies investigating academic achievement across the educational multi-correlates for student success for the Batwa. Since the population at the Rwandan primary school comprised about 32% potters, the opportunity to investigate academic achievement on a historically marginalized people added to the body of literature to influence educational policy for this people group.

The empirical analysis and results of this research may have major implications for policymakers, school administrators, teachers, parents, and students in Rwanda. Policymakers can better identify the areas of concern and offer programmatic changes to enhance student achievement. School administrators, teachers, and parents are oftentimes missing in the conversation on how to improve student achievement. As developing nations grapple with limited resources to meet the needs of students in providing access to education and increasing quality, this study explored low-cost measures through which policymakers, school personnel and parents can impact key educational predictors.

The objective of this study was to provide a comprehensive examination of educational multi-correlates that impact academic achievement as experienced by students at a primary school located in Kagina, Rwanda. The constructs were measured against student achievement as an output variable consisting primarily of test scores. Approval to conduct this research was sought from the Director General that oversees the Science, Technology and Research department within the Ministry of Education in Rwanda. As an additional governing body overseeing this research, an application was presented to the University of Georgia Institutional Review Board for approval to conduct research. As such, the goals for this study were to report findings, suggest implications, and offer recommendations. The generalizability of the study may lead to further research inquiries broadening the target population to include more primary and secondary schools. The researcher met personally with the Minister of Education and the Director General of Science, Technology and Research in June 2013 to discuss the research proposal.

There were three research constructs (child dimensions, household dimensions, and school dimensions) that were examined to determine relational and predictive qualities. Each construct contained various sub-variables or multi-correlates that were measured to ascertain both positive

and negative relationships. The sub-variables as reflected in the literature to influence academic achievement are discussed in more detail in Chapter 2.

Limitations

Some of the analytical methods used for this study have been used in previous studies (Agunloye, 2004; 1999; Hanafi, 2008; Makewa, Role, Role, & Yegoh, 2011; Rulinda et al., 2013; Shannon & Davenport, 2001). Based on the information gathered on education production function, there are some limitations to this study:

- The study is limited to nine quantitative input factors due to constraints of resources and time. There are obviously more than these nine input factors that may affect student performance in a primary school located in Rwanda. Some of these may be teacher quality, professional development, and other instructional support services, to mention just a few. As shown in the literature review, the factors selected are considered by the researcher to be important to student performance in general.

- The summative scaling instrument contained between 12 and 14 questions per dimension. Each research domain of household factors, school factors, and child factors contained multiple questions. The questions are designed to measure the multi-correlate set of independent variables. The ideal number of questions to address a given construct or variable is 30 (Bradburn, Sudman, & Wansink, 2004; Kim & Mueller, 1978). The developed scale does not have enough questions per independent variable to apply internal consistency measures of alpha coefficients adequately.

- The same limitation was present, in terms of possessing few numbers of questions per variable. The inherent limitation of performing an item or question analysis with a limited number of survey items per research construct was evident in this study. Since the

basic idea of item analysis was to reduce the number of questions on a scale (Spector, 1992), the limited number of questions on the current scale impedes this notion.

- In terms of measuring for internal consistency between variables, only Parental Involvement, SES, Chores, and School Resource variables maintained high internal consistency for the survey items. The remaining variables of Parental Education, Hunger, Health, and School Climate fell below the threshold for maintaining high internal consistency, and the survey items can be considered less reliable to measure survey item constructs.

- Because this study examines one school, the investigation of school factors presented challenges. Specific school factors such as teacher quality and school quality could not be measured due to the lack of comparative analysis with other Rwandan primary schools. These school factors are not specifically identified in the developed scale. Instead, based on the literature on school quality, researcher observations and school records were used to determine the school factors as contributory indicators on student achievement. In addition, the ethnicity and gender of students were used to codify the data set.

CHAPTER 2

LITERATURE REVIEW

Theoretical Framework for Social Capital

Establishing a theoretical framework for academic achievement in a developing nation can

be difficult. As discussed above, there was a dearth of literature that examined the Rwandan

educational system. There was, however, an abundance of literature that explored the relationships

between family, school, and children's abilities in Western literature. Although cultural

differences exist between American and Rwandan societies, the anthropological literature

demonstrated the importance of examining broader cultural constructs in educational research in

Africa (LeVine et al., 2011. One of the landmark studies on education in Western educational

research that began to parse out the role of cultural and/or societal constructs and their impact on

educational outcomes was the Coleman Report ("The Equality of Educational Opportunity")

(Coleman et al., 1966). Since the publication of this report, emphasis has been placed on the

sociological underpinnings that impact a child's progression in school. This seminal report was

widely accepted as an important study on schooling and was held in high esteem. Coleman posited

that the family dispositions can be separated into three areas, including human capital, social

capital, and financial capital (1988). According to Coleman (1988), children required these

"capitals" to assist in optimal growth. Lastly, Coleman (1988) argued that social capital served as

the medium through which children access their parents' financial and human capital. Although

Coleman separated capital into three distinct groups entailing social, human, and financial capitals,

the literature on the broader definitions of social capital encapsulated both human and financial

capital constructs (Bourdieu, 1986; Dufur, Parcel, & Troutman, 2013; Field, 2009; Hanafi, 2008; Putnam, 2000; Zeisler, 2012). For the purpose of this study, social capital theory served as a lens through which to examine the extent of how household, school, and child resources influence students' academic achievement.

According to Bourdieu (1986), "Social capital is the sum of resources, actual or virtual, that accrue to an individual or group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (as cited in Field, 2009, p. 17). This broad assertion included the social, human, and financial components consisting of, but not limited to, race, socio-economic status, family structure, parental involvement, parental educational level, school quality, teacher quality, student/teacher ratios, per-pupil expenditure, and family income (Zeisler, 2012. Although Mungai (2012) tried to limit the social capital construct as the relationship between children, their parents, and other members of the family, the consensus was that social capital was the sum of environmental influences on an individual's perceptions and behaviors. Dufur et al. (2013) stated:

> The creation of social capital is not limited to the family. Social capital associated with schools refers to investments between students and schools that can facilitate educational outcomes. Social capital theory, then, explains the mechanisms and processes by which bonds between children and other actors, such as their parents or their teachers, produce academic achievement. (p. 3)

For the purpose of this study, the social capital framework allowed for the exploration of influences on thought and action, and it was this theoretical framework that emphasized the impact of family, social status, monetary capital, and other sociological influences (e.g., education) on those thoughts and actions.

The varied definitions of social capital encompassed family backgrounds and the broader social interactions between organizations, specifically schools. According to Shriner, Mullis, and Shriner (2010), "Social capital theory has become an increasingly popular framework for conceptualizing the consequences of interpersonal relationships, family structure, and community attributes on children's academic performance" (p. 447). This was corroborated by Dika and Singh (2002), who reviewed 35 empirical articles appearing between 1986 and 2001 where social capital was used as a framework to examine components of educational outputs including academic achievement.

The study of the relationship between social capital and education was often concerned with the relationship between sociocultural factors and children's overall progress in school. This theoretical lens allowed researchers to examine educational inputs in reference to academic achievement and apply a conceptual framework for adapting theory. Since social capital was based on the culmination of interactions between relational factors centered on a child's experience inside and outside of school, studying the relationships between educational inputs and academic achievement was germane to understanding the holistic development of children within their society. This study was concerned with the educational inputs or multi-correlates within developing nations and how the constructs can impact children's academic achievement. Social capital in the form of variables related to the child, the home, and the school dimensions. The purpose for adopting this theoretical framework was to gain a sense of the influence of social capital on student achievement. The hypothesis put forward was that these social capital or educational inputs will indeed have an impact on test scores. However, analyses were conducted to understand the actual impact of these social capital units on academic achievement. The

following section used current literature to define the social capital variables or educational multi-correlates as they related to the child, the home, and the school dimensions.

Educational Multi-correlates and Academic Achievement

This section seeks to unpack the literature on educational inputs and student achievement in low-income countries. In the early 1970s, findings from the Coleman report on family influences on schooling, education, and achievement prompted researchers to begin performing comparative educational studies that often included developing nations (e.g., Baker et al., 2002). In the span of the next 40 years, researchers discovered numerous variables or contributory social capital-related factors that influenced academic achievement. During this era, researchers utilized student completion rates and student dropout rates as measures of student achievement in addition to test scores (Appleton, 1991; Glick & Sahn, 2000; Hungi & Thuku, 2010a). In keeping with the broad conceptualization of social capital theory as applied within the arena of educational inputs that influence students' achievement, the education inputs were operationalized as educational multi-correlates. The educational multi-correlates based on the literature were grouped into three constructs that included child dimensions, household dimensions, and school dimensions.

The literature investigating student academic achievement in low-income countries identified three dimensions of interest that impact test scores (Hanafi, 2008; Hungi & Thuku, 2010a; Woldehanna et al., 2005). The specific dimensions as identified in the literature in low-income countries included child dimensions (Colclough et al., 2000; Farmer et al., 2003; Glick & Sahn, 2000; Holmes, 2003; Lloyd, Mensch, & Clark, 2000; Mukudi, 2003; Zhao & Glewwe, 2010), home dimensions (Admasu, 2004; Barnard, 2004; Brown & Park, 2002; Galeb et al., 2005; Hanafi, 2008; Holmes, 2003; Lloyd et al., 2000; Sedibe, 2012; Smits & Hoşgör, 2006; Sukon & Jawahir, 2005;), and school dimensions (Glewwe & Jacoby, 1994; Hanushek, Lavy, & Hitomi,

2008; Hardman et al., 2012; Hayman, 2007; Lee & Zuze, 2011; Makewa et al., 2011; Otienoh, 2010; Pelini, 2009;). Bourdieu's (1986) definition of social capital was adopted to help highlight how the aforementioned educational multi-correlates contain resources for students that might aid their academic achievement. The following section reviews the literature across the three dimensions to help frame the theoretical underpinnings of this study.

Although the educational multi-correlates chosen for this study did not represent an exhaustive array of factors that impact student achievement, the variables in each dimension were heavily reflected in the literature. The subsequent section surveys the literature on academic achievement and the assortment of variables examined in this study. The section also presents a cursory reflection on additional factors linked to achievement that included, but were not limited to, completion and dropout rates, educational policy, opportunity and direct cost, gender roles, teacher and school quality, and school distance.

Academic – Child Factors

Success in school measured through empirical research has been an area of study focusing on the underlying factors that impact achievement. The literature points to numerous child characteristics that played a role in student learning, retention, and achievement (Heyneman & Loxley, 1983; Huang, 2010). In developing nations, the variables seemed less connected to educational system or process issues, but more so to the individual characteristics of the child. Research in low-income countries contended that a child's lack of food, health, and chores were the main characteristics highlighted in the observed literature on primary student achievement (Glick & Sahn, 2000; Hungi and Thuku, 2010a; Hungi and Thuku, 2010b; Mukudi, 2003; Ray & Lancaster, 2003).

Lack of nutrition, hunger, and poor student health have been reported to impact student learning (Hungi and Thuku, 2010a; Hungi and Thuku, 2010b). Additional studies have linked student achievement to health and nutrition (Abidoye, 2000; Glewwe, 2005). In a longitudinal Philippines study spanning 12 years investigating childhood nutrition and achievement, authors Glewwe, Jacoby, and King (2001) concluded that

> better nourished children perform significantly better in school, partly because they enter school earlier and thus have more time to learn but mostly because of greater learning productivity per year of schooling. Our cost–benefit analysis suggests that a dollar invested in an early childhood nutrition program in a developing country could potentially return at least three dollars' worth of gains in academic achievement, and perhaps much more. (p. 345)

Additional authors in rural China investigated child health and its relationship to student achievement measured by child weight and height (Zhao & Glewwe, 2010). The authors posited that relatively healthy children performed better in school. In Taiwan, Fu, Cheng, Tu, and Pan (2007) examined 222 elementary school children and suggested that children with a greater number of unhealthful eating patterns were more at risk for unfavorable overall performance in school.

The notion that nutrition and health impact achievement has been corroborated in studies performed in low-income African countries. Child health and nutrition have been strongly associated with educational achievement in African developing nations (Ampaabeng & Tan, 2013; Behrman, 1996). Abidoye (2000) examined nutritional history of 285 mothers in Nigeria and reported three succinct findings: 1. Overall nutritional health was found to significantly affect school performance; 2. Complications of pregnancy were found to significantly affect later school

performance; and 3. Birth complications were found to significantly affect later school performance. Furthermore, Alderman, Hoddinott, and Kinsey (2006), conducting research on malnutrition in rural Zimbabwe, reported that the indicator for health to include child height was associated with improving the number of grades preschoolers completed. In a Kenyan study looking at 851 pupils, the authors reported that the prevalence of nutritional stress was a significant educational problem and can be attributed to a function of status (Mukudi, 2003).

Hunger also played a key role in predicting student success. According to the Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) data set investigating 14 low-income countries (Smith & Barrett, 2011), students that ate more per day performed better in school.

This study used a derived variable of meals per day as an indicator of nutrition. In Group A, pupils receiving fewer than two meals per day were likely to attain a literacy score 14 points lower than a pupil in receipt of two to three meals per day. Of the four Group B countries, Botswanan pupils were most likely to receive fewer than three meals per day, some 46% of all pupils, and nearly 20% of pupils receive fewer than two meals per day. Those receiving fewer than two meals per day, on average, attained scores 36 points lower than those on three meals per day, and those on two to three meals 7 points lower than those on three meals. Namibian pupils receiving fewer than two meals per day attained 13 points lower in reading score (17% of all Namibian pupils surveyed) compared to a Namibian pupil receiving three meals per day. (p. 14)

The authors further asserted that reading scores and literacy rates were lower for children who ate fewer meals per day. This was also supported by Hungi and Thuku (2010a), who, using

the same data set, postulated that "pupils who ate more meals per week were estimated to achieve better in both subjects than pupils who ate fewer meals per week" (p. 36). The importance of breakfast has been linked to student performance (Grantham-McGregor, 2005). The author concluded that there was an urgent need to run long-term randomized controlled trials of giving meals in poor countries to determine the effects of nutrition status of children and the timing of meals. The assertion that meal frequency influenced academic achievement was also reinforced by Vermeersch and Kremer (2005) in looking at the effects of food programs in Kenya.

Not surprisingly, poor nutrition and overall student health have also been linked to higher dropout rates for children in developing countries. In a study, Jamison (1985) observed a strong negative relationship between poor nutritional conditions (measured by low height-for-age and weight-for-age) and children's grade repetition rates in China. The number of daily meals eaten has also been noted as a factor for school dropout (Smith & Barrett, 2011). Woldehanna et al. (2005) further underscored the findings that suggested poor nutrition and hunger contributed to poor school attendance in the Philippines (Glewwe et al., 2001), Chile (Vegas, 2002), and Kenya (Mukudi, 2003). Similar findings were documented in a study of primary school children in rural Jamaica, with higher academic achievement being negatively associated with malnutrition (Hutchinson, Powell, Walker, Chang, & Grantham-McGregor, 1997). In the United States, options for better nutrition and health included breakfast and lunch programs designed to increase school attendance and enrollment, improve cognitive ability, and increase school performance (Fernald, Ani, & Grantham-McGregor, 1997). However, in low-income countries, these options were not always readily available due to cost. The lack of economic resources to adequately nourish students affected school attendance and students' ability to perform.

Although student health and nutrition have been widely accepted as contributory factors that influence student achievement, children's duties outside of school have also been linked to an impact on school performance for primary school-aged children in low-income countries. Heady (2003) examined the effect of children's work on learning achievement. The author suggested that work outside the household had a significant effect on student performance in school. More specifically, the author reported that work had a substantial effect on learning achievement in the key areas of reading and mathematics. In a similar study conducted in Paraguay, Patrinos and Psacharopoulos (1995) found that 60% of the children examined worked more than 40 hours per week and 30% worked more than 50 hours per week. This was directly linked to lower school performance, especially if children who worked had siblings. Some of the rationale for child labor as it related to achievement was noted by Edmonds (2006) in a South African study, in which he hypothesized that elder males force rural families into less schooling for boys.

In terms of looking at child labor for students in low-income countries, chores have also been associated with a negative impact on student performance in school. This claim was held by Simon (1991) in a South African study in which he cited domestic chores as a reason for poor academic performance for students. In another South African study, Hemson (2007) posited that children collecting water, often over long distances in rural communities, was one of the most common forms of child labor. Furthermore, out of the time per week spent in domestic activities, two-thirds was spent collecting water. The study found that being late for school, being unable to concentrate in class, having poor morale, and needing to leave school as early as possible to collect water negatively impacted learner performance.

There were differences in chores based on gender (Mungai, 1998; Mungai, 2012). The author suggested that "the chores of the girls may include selling in the market, cleaning, cooking,

fetching firewood and taking care of younger siblings" (Mungai, 2012, p. 71). On the other hand, according to Colclough et al. (2000), boys were mainly involved in working on the family farm, ploughing and harvesting crops, looking after livestock, and fetching water. Gender parity research in academic achievement in East Africa indicated prevalent distinctions of student performance based on culture practices. The most important adverse cultural practice was the division of labor (Colclough et al., 2000). Girls were expected to care for siblings, help with household duties, and get married at early ages. These cultural practices were associated with lower performance in the education of girls (Hungi & Thuku, 2010a). This assertion was corroborated by the Institute of Economic Affairs (2008); a key determinant of poor performance in school for girls was the home work responsibilities assigned to the girls. For example, in a study that investigated household structure in West Africa, researchers concluded that domestic responsibilities impinged strongly on girls' education (Glick & Sahn, 2000). The authors further asserted that both the direct and opportunity cost of schooling affected girls and boys differently. It was reported that boys had more readily available opportunities to earn money for school fees in contrast to girls.

The opportunity cost for children in developing countries included children working to supplement household income, perform household chores, care for siblings, and engage in gender-specific cultural practices (Bredie & Beeharry, 1998; Colclough et al., 2000; Hillman & Jenkner, 2004). The opportunity cost to attend school for poor families in low-income countries was high, as cost oftentimes directly competes against school attendance. Girls, in particular, were thought to have a higher opportunity cost as opposed to boys due to cultural differences, including sibling care and household chores (Kibugi, Cheserek, Murgor, & Mutwol, 2013). Glick and Sahn (2000)

recommended policies to subsidize childcare that reduce the opportunity cost of girls' time in the home, which may lead to greater opportunities for girls to receive an education.

> Where families use their children as a source of labor, sending them to school can
> be costly because the benefits of such labor are thereby lost, at least for the duration
> of the school day. The combined impact of these opportunity costs, together with
> meeting the direct costs of school attendance, can be substantial for poor families
> and can be an important cause of children not being enrolled. (Colclough et al.,
> 2000, p. 17)

In a Ghanaian study (Gadagbui, 2003), researchers found that when children were bogged down with chores and poor nutrition, it negatively impacted student achievement. The author determined that girls were found to be involved in more household chores and caring for siblings. In addition, girls being forced to marry at an early age, which contributed to the lack of enrollment and progression in school, impeded their ability to do well in school. Lastly, both female and male teachers' attitudes were biased against girls, believing that boys were more intelligent and more interested in learning than girls (Glick & Sahn, 2000). The results of this study pointed to the fact that the opportunity cost for girls was higher than for boys.

Although gender disparities over the last quarter-century have diminished, gender parity has remained a problem (Hungi & Thuku, 2010a). The main reason for gender differences in achievement had to do with perceived value. Girls were often married off early. This forced them to withdraw from school (Colclough et al., 2000). In addition, the onset of puberty imposed problems and concerns from parents ranging from safety and school cleanliness to female teacher role models (Kutnick, 2000; Oxaal, 1997; Woldehanna et al., 2005). For example, in a Kenyan study that explored child factors in girls, the author established that domestic factors including

household chores contributed to girls not performing well in school compared to boys and described how cultural practices influenced education (Kibugi et al., 2013). As noted in a Guinean and Ethiopian study, the culmination of cultural practices including sibling care and gender-based work roles contributed to lower levels of attendance in school (Colclough et al., 2000). As a result, girls performed poorer in comparison to boys in developing nations. Researchers found:

> Factors related to cultural norms, traditional beliefs and practices can have a strong influence on girls' enrollment, persistence and performance in school. Some societies regard the pregnancy of unmarried daughters as culturally shameful. To avoid embarrassment, parents, in some rural areas, give their daughters in marriage as soon as they reach the age of puberty, and sometimes earlier. In one of the regions visited in Ethiopia, girls are married as early as the age of eight years. In this region, amongst those interviewed, almost half of the girls who had never enrolled in school, and one-third of those who had dropped out, were either married or divorced. (Colclough et al., 2000, p. 22)

Academic – Household Factors

The home environment of children was another area that influenced student performance in school. More specifically, family socio-economic status, parental educational levels, and parental involvement in school related activities were sub-dimensions within household characteristics that contributed to academic achievement (Kutnick, 2000). Each sub-domain was predicated on the underlying assumption that higher-income households produced higher-achieving students. Increases in household income led to greater investments in girls' schooling (Glick & Sahn, 2000). Woldehanna et al. (2005) highlighted the effects of wealth on higher levels of attainment. Behrman and Knowles (1999), in their research on Vietnam, found a significant

association between household incomes, the age the child started school, and exam scores in the last completed grade. The impact of income was also particularly significant in the case of boys' academic achievement (Brown & Park, 2002; Holmes, 2003).

The income levels within low-income countries vary across cities, communities, and families. The literature regarding family wealth indicates that socioeconomic status played an important part in determining school completion (Appleton, 1991; Hanushek & Lavy, 1994). More specifically, the wealth of families increased the likelihood that students will succeed in school. For example, in a study conducted in Kenya on the primary differences between girls and boys, researchers reported that children who scored higher on the household wealth index for home quality and materials owned had higher school completion rates than children who received a lower score on the household wealth index (Lloyd et al., 2000). In a similar study conducted in Pakistan looking at determinants of school completion, Holmes (2003) found that the value of land and property owned by the household influenced school completion. The more land and property owned by parents in Pakistan, the more likely that children completed school at the primary level. The results reemphasized the importance of establishing poverty reduction initiatives within developing countries to develop policies to advance per capita levels of income.

Socioeconomic status played a large part in providing the resources needed to matriculate and perform in school (Colclough et al., 2000; Fuller, 1987; Hungi & Thuku 2010b). Other authors reported that socioeconomic status played a significant role in determining student completion rates (Fleisch & Shindler, 2009; Lee & Zuze, 2011). In looking at mathematics and reading achievement levels in Kenyan boys and girls, researchers Hungi and Thuku (2010a) reported that students who could afford learning materials such as books, pencils, pens, notebooks, and rulers were estimated to achieve better scores in both reading and mathematics. In another study

investigating achievement in 14 sub-Saharan countries, researchers reported "very strong and consistent links between SES and achievement" (Lee et al., 2005, p. 237). Conversely, children from lower SES who experienced lack of food (Hungi and Thuku, 2010a; Mukudi, 2003), and lack of materials and household possessions (Smith & Barrett, 2011) performed worst in school. This was supported by Colclough et al. (2000), postulating that home assets are often used as an indication of socioeconomic status of a household.

An additional indicator of wealth in low-income countries is the measure of household possessions. Hungi & Thuku (2010a) measured books at home, sources of light, home conditions, textbook ownership, and quality of house as indicators of parental wealth. More specifically, the author measured the use of electricity, telephone, and other electrical devices to determine the wealth pattern of households. The author concluded that pupils with more house possessions performed better in both mathematics and reading. Using the same data set, authors Smith and Barrett (2011) pointedly reported to the extent electricity is a predictor of student academic achievement in several African countries.

In Kenya, a pupil with a candle/paraffin/oil lighting source for study was likely to score 24 points higher than a Kenyan with no artificial lighting source. In Botswana, pupils using candle/oil/paraffin and electric lighting on average scored 15 and 37 points higher respectively than those without artificial lighting. A Zambian with electric lighting on average scored 38 points more than a Zambian without any lighting in the home. Namibian pupils with electric lighting (40% of all Namibian pupils surveyed) fared some 10 points better than pupils with either another source of lighting or no lighting for study. In Lesotho, where the main source of lighting

is candle/oil/paraffin, pupils with gas lighting scored 20 points more than pupils

without lighting or other lighting source access in the home. (p. 13)

Other household characteristics that contributed to how well students performed in school were household structure and parental education. Woldehanna et al. (2005) suggested that in Ethiopian families where there were numerous siblings, the older siblings pay for the younger siblings to attend school. This level of sibling assistance reduced the direct and opportunity costs for the younger siblings. This family dynamic reduced the level of school dropouts. Woldehanna et al. (2005) also noted that female-headed households had a greater tendency to allow their children to attend school. This was specifically evident in situations where higher maternal education level was attained.

Parental education has also been shown to significantly increase student achievement, school enrollment, and completion rates. Moyi (2013) found that for children in Uganda, educational attainment of parents contributed to children's daily school attendance and school completion rates. Additionally, parental past educational experiences influenced children's continued access to and progress through school. In a study conducted in West Africa by Glick and Sahn (2000), a mother's education was found to have significant impact on daughters' schooling. In addition, the findings reported that a father's education raised the completion rates for both girls and boys. Parental levels of education impacted both student achievement and school completion.

Higher parental levels of education have been linked to higher levels of student achievement. Furthermore, the level of parental involvement in their child's education also impacts student completion rates. In a study using parent reports that identified home involvement,

results indicated that parental involvement was associated with indicators of school success (Barnard, 2004).

> Efforts to involve parents should be grounded in the knowledge that parents' beliefs about their roles in children's schooling and their effectiveness in helping their children succeed are the primary points of entry into increased, and increasingly effective, involvement. (Hoover-Dempsey & Sandler, 1997, p. 35).

Paternal and maternal levels of education were significant factors in creating a positive home environment and influencing student academic attainment (Admasu, 2004; Galeb et al., 2005; Smits & Hoşgör, 2006). The influence of a father's educational attainment has been reported to positively impact both boys and girls. More specifically, additional research highlighted the fact that the father's educational level played a larger role in boys (Hanushek & Lavy, 1994; Tansel, 1997). A mother's educational attainment level was also reported to influence both boys and girls. Girls were reported to perform better as opposed to boys in reading when mothers were educated (Glick & Sahn, 2000). Woldehanna et al. (2005) posited, "Children from households headed by married women had significantly stronger educational attainment than children from male headed households" (p. 9). Research on parental education and access to books and reading materials influenced student achievement as well. For example, in a study in Mauritius on the impact of parental educational support on numeracy test results, researchers found that parental support of education at home positively impacted student achievement (Sukon & Jawahir, 2005). In a similar study in Malaysia, researchers reported that both parents' level of education and reading materials available in the home were related to children's academic achievement (Hanafi, 2008).

Parental involvement was another household characteristic that has been linked to influence on student performance in Africa. For example, in a South African research study that

investigated correlations between parental involvement and academic achievement, investigators reported positive correlations between parental involvement and student achievement (Bojuwoye & Narain, 2008; van Staden & Bosker, 2014). Alternatively, in a similar study on South Africa, researchers examined linkages between parental involvement at disadvantaged schools and student performance. The researchers suggested that a lack of parental involvement in the teaching and learning of their children contributed to a lack of successful academic achievement of children in schools (Sedibe, 2012). In contrast, other empirical studies found that parental support had an inverse influence on reading scores for children (Smith & Barrett, 2011) and more specifically affected older learners negatively as opposed to younger students (Patall, Cooper, & Robinson, 2008). This inverse relationship was best explained by Okagaki and Frensch (1998), who concluded that various forms of parental involvement have different relationships to achievement and varies across ethnic groups. For example, the authors concluded that "ethnic group differences emerged in parents' expectations for children's educational attainment, grade expectations, childrearing beliefs and children's school achievement" (p. 123).

More specifically, parental involvement has been associated with a direct impact on literacy levels in low-income countries (Geske & Ozola, 2008; Howie et al., 2009). A study conducted by Senechal and Young (2008) also found parental involvement to be of pivotal importance in children's reading literacy development and that larger effects could be expected when parents tutored their children using specific literacy activities. Lynch (2002) found significant relationships between parents' self-efficacy beliefs and children's reader self-perceptions. Alternatively, parental involvement has shown little or inverse impact in other academic disciplines, including math and science. Mji and Makgato (2006) reported that the role played by the parents in their children's education had an indirect influence on math and science

achievement. This was substantiated by Mji and Mbinda (2005) in their examination of science students' perceptions of parental involvement. The authors determined that "students indicated that their less educated parents were involved in activities pertaining to their learning; however, high perceived parental involvement in curricular activities was related to low achievement" (p. 327).

Poverty has been linked to impact levels of parental involvement. Researchers Smit and Liebenberg (2003) examined the extreme poverty context in Cape Town, South Africa, and how schools presented challenges for both children and parents. The authors concluded that schools can play a part in increasing parental involvement to help students perform. In addition, Okeke (2014) reinforced the notion that parents are often intimidated by the operational structures of school and discussed how schools can develop strategies to get more parents involved. The findings showed the importance of parental involvement and what schools can do to foster engaged parents. Lastly, researchers found that parental involvement in schools was significantly associated with lower rates of school dropouts (Admasu, 2004). Jimerson, Egeland, Sroufe, and Carlson (2000) reported that parent involvement had the highest discriminating power on dropout rates in the sixth grade. The authors recommended that school professionals and policymakers develop intervention and prevention programs during the first five years of schooling to mitigate school dropout.

Academic – School Factors

School factors have been noted to influence academic performance for children in both high-income countries (Harbison & Hanushek, 1992; Murnane, 1975) and low-income countries (Fuller, 1987). Some of the most notable school factors included grade repetition (Brophy, 2006), teacher quality (Bustillo, 1989), school quality (Glewwe & Jacoby, 1994), classroom resources,

and school management (Fuller & Clarke, 1994). Given the limitations of school access, insufficient number of schools, and lack of teachers, the opportunity for children to attend quality schools was rare (Lee & Zuze, 2011). The problem was exacerbated in rural and remote regions within low-income countries (Heyneman & Loxley, 1983). Since the majority of school-aged children in low-income countries attended schools in rural and remote communities, high grade repetition rates and the lack of quality teachers and schools can have a detrimental impact on student performance.

Grade repetition has been associated with an impact on academic achievement for students in low-income countries. For example, in a study looking at African primary schools located in Botswana, Malawi, Namibia, and Uganda, using data from the 2000 Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ-II), Lee and Zuze (2011) concluded that achievement and grade repetition were strongly related. Additionally, Hungi and Thuku (2010a) reported a negative relationship between grade retention and academic achievement. The authors theorized that "pupils who had never repeated a grade were estimated to achieve better in mathematics and reading than pupils who had repeated a grade one or more times" (Hungi & Thuku, 2010a, p. 36). In a study examining 14 sub-Saharan countries, researchers reported that 50% to 60% of all sixth-grade students who repeated at least one grade level were likely to attain lower test scores (Smith & Barrett, 2011; Lee et al., 2005). The long-term impact of grade repetition on test scores included negative impact on self-esteem, poor peer relationships, and pessimistic attitudes toward school (Brophy, 2006).

Most research on grade repetition and its impact on educational outcomes has been conducted in developed countries (Brophy, 2006). In developed and developing countries, teachers play a clear part in deciding the retention of students. Brophy (2006) posited that in

developing countries, teachers were untrained in using assessments to determine retention. Conversely, studies conducted in rural Brazil (Gomes-Neto & Hanushek, 1994) and in rural Pakistan (King, Orazem, & Paterno, 1999) found that promotion decisions were closely related to measured achievement. In developing countries, teachers did not have access to national performance indicators and thus based promotion on relative performance compared to peers. Ikeda (2005) concluded that the retention disparity between student proficiency in high- and low-achieving schools was based on a lack of national standards and norms.

Student age has also been reported as a barrier to student achievement. Research conducted in Pakistan and Kenya suggested that older children entering primary school were more likely not to perform in school (Holmes, 2003; Lloyd et al., 2000). Likewise, children who experienced grade repetition progress through school at higher ages and have also been linked to increased school dropout rates (Hungi & Thuku, 2010b). Entering school at an advanced age due to grade repetition, as compared with peers, was an important factor that school headmasters in developing countries can confront to reduce low student performance. Although research indicated that grade repetition contributed to lower grades, the underlying reasons students repeat grades were varied. Gomes-Neto and Hanushek (1994) suggested that low academic performance and lack of higher schooling opportunities contributed to grade repetition.

Lastly, there were negative effects on students' emotional, social, and behavioral aspects associated with grade retention. "School imposed grade repetition is stressful to students and associated with reduced self-esteem, impaired peer relationships, alienation from school, and sharply increases the likelihood of eventual dropout" (Brophy, 2006, p. 16). The amalgamation of these risk factors for students who repeated grades increased the chances that students did not perform in school (Holmes, 2003; Jimerson et al., 2000).

Just as grade repetition has been linked to influencing student school performance, teacher quality has been noted to impact students' achievement. In terms of teacher quality, there were a number of research studies that indicated positive effects on student achievement. Some of the characteristics that delineated quality of teachers were their participation in pre-service and in-service teacher training, professional development activities, and mastery of subject matter (Hardman et al., 2012; Otienoh, 2010; Pelini, 2009). Fuller (1987) noted that knowledge of subject matter and verbal proficiencies had strong effects on achievement in primary school. In a South African and Botswanan study on teacher quality that investigated 183 sixth-grade classrooms, researchers ascertained that students earned significantly higher mathematics scores when teachers possessed higher mathematics knowledge (Sapire & Sorto, 2012). Similarly, in a study in Namibia looking at reading and mathematics scores, researchers found that students achieved at significantly higher levels in schools that employed higher-quality teachers (Lee & Zuze, 2011). More exposure for teachers in their respective subjects directly translated into better-performing students.

> Three broad aspects of the educational process have been identified in the school-effectiveness literature as contributing to positive outcomes on various types of standardized tests. Each of these has been associated with many individual elements: (1) time to learn, such as the hours school is in session and the time spent in the classrooms; (2) material inputs, such as classrooms, books, desks, and libraries; and (3) effective teaching, such as pedagogical practices and teachers' competence. (Lloyd et al., 2000, p. 117)

School quality has also been connected to determining the success of students' performance in school. Quality of school and levels of grade completion by students were directly

linked to student achievement (Colclough et al., 2000; Hanushek et al., 2008). The determining dynamics of school quality included classroom resources, access to learning aids and books, teacher/pupil ratio, and bathrooms (Hanushek & Lavy, 1994). Research considering the effects of school quality in low-income countries attributed school quality to a significant increase in academic achievement in developing countries (Fuller, 1987; Fuller & Clarke, 1994), in what was described as the "HL Effect." Heyneman & Loxley (1983) found that in low-income countries, the overall proportion of variance in student achievement was largely associated with school-level effects (Huang, 2010). Contemporary re-visitation of the HL Effect in the Philippines did not support the presence of the HL Effect (Huang, 2010). This inconsistency was attributed both to the income levels of families and their students and to whether or not the schools in the Filipino study were located in urban versus rural areas.

The quality of schooling in developing countries was found to reduce student dropout rates in schools. Research on school quality and students' inability to perform well in school indicated a relationship between school quality and student performance (Colclough et al., 2000; Lloyd et al., 2000). School quality indicators included qualified teachers, classroom learning materials, access to books, teacher/pupil ratio, and separate clean bathrooms for girls and boys (Hanushek & Lavy, 1994; Hanushek et al., 2008). The overarching consensus in the literature asserted that students attending schools of poor quality tend to dropout at higher rates. Woldehanna et al. (2005) asserted that low-quality schools discourage households from sending children to school. In response to low-quality schools, families, in turn, encouraged their children to work. In particular cases for girls, the absence of bathrooms in schools (particularly of separate bathrooms for girls) caused girls to be absent from school (Brock & Cammish, 1997).

School quality is uniformly statistically significant when introduced into a

regression analysis of the determinants of individual enrollment, dropout, or grade

attainment, with better quality leading to higher enrollment and grade attainment.

(Lloyd et al., 2000, pp. 115-116)

In looking more closely at the relationships between teacher and school quality and student

performance in mathematics, Howie et al. (2009) and Howie (2005) concluded that the location of

the school, teachers' attitudes and beliefs, teacher load, lesson planning, and class size had a direct

effect on South African pupils' performance in mathematics. Maree, Aldous, Hattingh,

Swanepoel, and van der Linde (2006) reported that math and science student test scores were

significantly correlated with higher student performance, as a direct result of qualified teachers.

In addition, the authors reported that teaching methods and teaching strategies positively impacted

student performance. This is also supported by Mji and Makgato (2006), who theorized that

teaching strategies had a direct influence on math and science achievement. Alternatively, Howie

(2003) concluded that inadequate subject knowledge of teachers, inadequate communication

ability between learners and teachers in the Language of Learning and Teaching (LOLT), lack of

instructional materials, difficulties for teachers to manage classroom activities effectively, pressure

to complete examination-driven syllabi, heavy teaching loads, overcrowded classrooms, poor

communication between policymakers and practitioners, and lack of support due to shortage of

professional staff in the ministry of education related to learners' poor performance in mathematics

in South African classrooms.

There was empirical evidence suggesting that the availability of school and classroom

materials influences academic achievement in students from low-income countries (Kemi, 1990;

Mukudi, 2003). School and classroom materials consisted of books, pens, pencils, rulers,

notebooks, erasers, paper, and other learning aids (Hungi & Thuku, 2010a). Mudulia (2012), in a Kenyan study, found that students' performance in science was higher when schools possessed textbooks, lab chemicals, and equipment than in low-performing schools that did not have school resources. Additional studies that investigated school performance factors on primary schools and secondary schools in Kenya found that schools with better classrooms, libraries, and water supply performed considerably better than schools with poorer levels of these facilities (Onderi & Croll, 2008; Sifuna, 1989).

The literature on school-related factors that affect student achievement also included school cost and the distance between home and school. Researchers have ascribed terminology that depicts the relative cost associated with schooling. The direct costs of schooling included school fees, materials, and uniforms (Brown & Park, 2002). Although many East African countries (including Rwanda) have established policies to ensure free primary level education, there were other costs that impeded a child's ability to attend school, including books, uniforms, and transportation (World Bank, 1995). Children from poor families that experienced difficulty in meeting the direct cost of schooling had a greater chance of not performing well in school (Glick & Sahn, 2000; Lloyd et al., 2000). According to an Ethiopian and Guinean study, "an inability to meet the direct cost of schooling was found to be one of the most important causes of non-attendance in both countries" (Colclough et al., 2000, p. 15).

Another major factor affecting student achievement was the distance between home and school. This school characteristic, in terms of safety, was a primary concern for parents of girls. Parents worried that daughters might be subjected to sexual harassment (Colclough et al., 2000). For example, in a research study conducted in Ethiopia and Guinea, investigators administered a survey to measure the distance students traveled to obtain their schooling by drawing a map of

relationships between home, village, and school landmarks. The study concluded that the length of the journey to school affected the attendance of both boys and girls (Colclough et al., 2000). Other concerns regarding distance to school addressed the level of energy children expended in walking to school. A long walk to school reduced a student's ability to learn (Glewwe, 1999; Tilak, 1989). A lengthy walk to school measured in terms of kilometers to school led to higher dropout rates for both boys and girls.

There have been a number of authors who have studied characteristics of school climate, including trust and co-operative learning (Ghazi, 2003); positive school climate (Marzano, 2007); relationships between students and school personnel (Catalano, Haggerty, Oesterle, Fleming, & Hawkins, 2004; Karcher, 2002); and detrimental effects of bullying (Moswela, 2010). Cohen, Pickeral, and McCloskey (2009) reported that nearly all researchers agree with the National School Climate Center (2012) on the major factors that impact school climate. The factors were safety, interpersonal relationships, teaching and learning, and institutional environment. The consensus in the literature on the subject was that school climate can play an important part in identifying strategies that promote better school environments centered on student achievement. Lastly, Makewa et al. (2011) found that school climate had a significant influence on academic performance of students in provincial secondary schools in Nandi Central District, Kenya.

A sustainable, positive school climate fosters youth development and learning necessary for a productive, contributing and satisfying life in the society. In other words, when students, in partnership with educators and parents, work to improve school climate they promote essential learning skills (e.g., creativity and innovation skills, critical thinking and problem solving skills, communication and collaborative skills) as well as life and career skills (e.g., flexibility and

adaptability, initiative, social and cross culture skills, productivity and accountability, leadership and responsibility) that provide the foundation for 21st century learning. (Makewa et al., 2011, p. 101)

Schools that provided an optimal level of social, emotional, and academic learning also tended to have a participatory and receptive school climate (Blum, McNeely, & Rinehart, 2002). "Components of a school culture can support or impede learning thereby affecting academic performance of students either positively or negatively" (Makewa et al., 2011, p. 97). For example, in a Ghanaian study of 1,171 participants from 25 primary schools, examining components of school climate to include teaching and learning materials, textbooks, availability of professional teachers, payment of school fees, in-service training, regular staff meetings, preparation and vetting of lesson notes, and availability of infrastructure and materials, Etsey (2005) found that a subsample of the research population that included high-achieving schools performed better as opposed to the remaining low-performing schools. In addition, the author concluded that poor school environment was primarily responsible for low academic performance.

Finally, educational policy was an external factor that impacted schools in relation to student achievement. Many developing countries have aligned their respective educational policies with the United Nations Millennium Development Goals (MDGs) (Hayman, 2005; Kabeer, 2003; United Nations, 2012). A key component of the MDGs was to increase access to quality education for all. Education policy has directly influenced the global discussion and ushered in various policy-oriented initiatives to reduce school dropouts (Hayman, 2007; Ministry of Ethiopia, 2005). Some of these policies included compulsory education (MINEDUC, 2003a), education sector funding, grade promotion (Lillard & DeCicca, 2001), and teacher retention and training (Ministry of Ethiopia, 2005; World Bank, 2004). Low-income countries have benefitted

from the development of policies to modify school factors that influenced dropout rates and school completion.

Historically Marginalized People

Historically, Rwanda comprised two primary tribes prior to the 1994 genocide: the dominant Tutsi minority and the majority Hutu. There was also a small micro-tribe called the Batwa, or Twa, which comprised only 1% of the population (New Internationalist, 2002; Schweisfurth, 2006). Legislation within Rwanda heavily discouraged categorizing or identifying individuals as Hutu or Tutsi and contended that everyone is Rwandan. The country recently allowed identification of a small people group referred to as the Batwa. The Batwa, according to GoR, was the only people group that is classified as a "historically marginalized people" (Thomson, 2009). This was important because a considerable percentage of the target population for this study comprised the Batwa people group. Attempts to shed light on the historical and current challenges that face the Batwa were reviewed in context within the target population of the study.

The Batwa, historically and traditionally, have been a semi-nomadic "hunter-gatherer" people of the highlands and woodlands. They were thought of as being the oldest recorded inhabitants of the Great Lakes Region of Central Africa. Batwa populations have been found in several East African countries, including Rwanda, Burundi, Uganda, and the eastern portion of the Democratic Republic of Congo (Warrilow, 2008). Due to the development in East Africa, as a result of land clearing for agriculture, logging, development projects, or the creation of conservation areas, the Batwa have been forced to leave these areas and establish new homes (Manirakiza, 2013). The Batwa have lost all ancestral rights to land, and the current government

in Rwanda did not offer any compensation for land lost. Most Batwa were thought to live in extreme poverty with no means to make a living besides making pottery.

> Well in advance of European intervention in Rwanda, interactions between Twa and others were governed by practices of avoidance in marriage, residence, and commensality. Moreover, Twa were denied access to core productive resources; they could neither cultivate the land nor raise cattle. Instead, they were relegated to the least esteemed productive activities: foraging, pottery making, entertainment, and serving as torturers and executioners for the Rwandan king. Later during Rwanda's pre-colonial history, similar mechanisms of differentiation began to characterize interaction between Tutsi and Hutu. These practices were exacerbated during the colonial period due to European notions of biological determinism. (Taylor, 2011, p. 187)

As a result of the 1994 genocide, GoR developed the National Unity and Reconciliation Policy of 1999 to denounce ethnic classification, which the government believed was the root cause of the 1994 genocide. "New laws against ethnic divisionism were passed in 2001, ethnic self-identification, in fact, became criminal. The fines were severe: prison sentences up to 30 years and fines as high as five million Rwandan francs (US$8800)" (Thomson, 2009, p. 314). While the Rwanda constitution (2003) rejected ethnic classifications, it did recognize an undefined group referred to as "historically marginalized people." According to the National Social Protection Strategy (GoR, 2011), "historically marginalized people—who number around 25-30,000 in total—were believed to experience higher levels of poverty and worse social indicators than the general population, although little objective data is available" (p. 13).

The Batwa were often referred to as "potters" because 95% of those who work make pottery. With no land or legal representation in the government, they have been relegated to land squatting and making pottery to survive. According to Communautes des Autochtones Rwandais (CAURWA) in 2004, they reported that 43% of Batwa families had no access to land, compared to 12% of families nationally. Seventy-eight percent of Batwa families were tenants on the land they were cultivating. Moreover, 43% lived on lands of less than 0.5 hectares. In addition, according to the CAURWA survey (2004), the average monthly income of the Batwa was 5,426 Rwandan francs (10 USD). This was insufficient to feed a Batwa family of approximately five persons. Manirakiza (2013) suggested that the inability to properly provide for the average Batwa family leads to begging and reinforces marginalization and exclusion.

McDougall (2011) stated that "Batwa children experience significant obstacles to their right to education relative to other population groups, including low levels of enrollment, particularly at the post-primary level, very high dropout rates and poor education outcomes" (p. 17). According to the survey conducted by CAURWA (now COPORWA) in 2004, only 23% of the Batwa can read and write compared to 52% for the overall Rwandan population. In 2004, only 34% of Batwa were attending school. In a subsequent study conducted by Thomson (2009), he concluded that 77% of the Batwa were illiterate, 51% have never attended school, 47% had no farmland, and 30% were unemployed (less than 2% nationally). The overall lack of education hindered their inclusion into the broader Rwandan society and reinforced marginalization of the Batwa.

GoR has developed policies to help the Batwa. "Measures were taken by the Government to guarantee free primary and secondary education for Batwa children" (Manirakiza, 2013, p. 247). This was accomplished by exempting the Batwa from paying school fees. Despite the exemptions

of school fees, many Batwa lack money to pay for school supplies, uniforms, and food. Poverty remains a large challenge within the Batwa communities. McDougall (2011) concluded that while "the government has instituted assistance programs, those programs have failed to be effective for the Batwa as a whole … the poor living conditions of some Batwa families are clearly affecting the ability of Batwa children to attend school or achieve good education outcomes" (p. 17).

Understanding the historical context that underscores the present-day realities of life for the Batwa was significant for this study. The Batwa historically have been disenfranchised and plagued with poverty, hunger, and vast limitations both in employability and educational opportunities. There was a paucity of literature examining student achievement with this specific population. This study sought to determine the impact of the multi-correlate factors that affect academic achievement on Batwa primary school-aged children. The ethnicity of "historically marginalized people" served as a point of inquiry for this study.

Summary

To summarize, the three dimensions that can have an effect on student success in terms of academic achievement in school consisted of measurable indicators including child-related variables, home-related variables, and school-related variables. Although no research studies looking at student achievement in low-income countries have formalized a theoretical framework for assessing educational multi-correlates, the review of the literature painted a vivid picture that perhaps can form the basis of discussions in improving student success in school.

As discussed in the literature regarding factors that impact student achievement, programs and policy initiatives targeted at parents and school personnel can increase student completion and performance. Increasing school administrators' knowledge of student success can positively impact children in low-income countries. The implications reflect the triangulation of mitigating

programmatic components to increase student performance in school. Likewise, policy suggestions can be made to enhance the discussion surrounding increasing student performance and propose strategies to address low performance. The student achievement literature can play a large part, particularly in low-income countries, in shaping education policy.

In looking at several low-income countries within Africa, the education policies that govern schools did not identify the factors that impact student performance nor maintain systemic approaches to mitigate student failure in school. Many of these countries adopted the United Nations Millennial Development Goals (MDGs) without a clear plan that addressed the impediments to student success in school. In Rwanda, the Ministry of Education developed the Education Sector Strategy Plan (MINEDUC, 2010) to increase the completion rates, but they identified no specific approaches to improving levels of school quality. The plan ensured that more schools are built and that children participate in free Universal Primary Education (UPE), but it offered no strategy to address issues of parental involvement or school and teacher quality. The Department for International Development (DFID) performed a research study looking at six low-income countries, including Ghana, India, Kenya, Rwanda, Tanzania, and South Africa, that examined basic and post-basic education on achieving the MDGs and the changes in policy positions over time to meet the MDGs and simultaneously reduce poverty. The findings as reported by Palmer, Wedgwood, Hayman, and Edinburgh Centre of African Studies (2007, p. 43) are highlighted below:

1. International and interstate studies showed positive correlations between post-basic education levels and economic growth and equality and negative correlations with poverty levels.

2. The historical experience of earlier pushes for UPE in Africa indicated that rapid expansion at the expense of quality can lead to inequity and diminished returns to primary education. Expansion at the primary level needs to be balanced with expansion of the post-primary system.

3. Access to post-basic education and training was generally strongly biased towards children from wealthier families and urban areas. Expansion has the potential to make it less biased. The rural poor can be assisted through sponsorships and provision of boarding facilities, but the allocation of these benefits needs to be carefully targeted and corruption free. The quality of primary education in poor rural areas needs addressing.

In review of the policies to increase educational access and equity and the economic policies to reduce poverty in low-income countries, the six countries represented in the study did not have initiatives to target school and teacher quality programs at the basic education level. DFID suggests, "even in schools and countries that have environmentally promising conditions, if the quality of the schooling or of the skills training is of low quality, the claim that schooling directly makes a difference should be tempered" (Palmer et al., p. 71).

Additional research was performed in a cross-national study focusing on key issues and policy considerations in promoting learning in Ethiopia, Kenya, Namibia, Rwanda, and Tanzania. The authors provided the following statement:

In addition to expanding access and improving equity, enhance the quality and relevance of formal education by improving understanding of and responding to the demands for individual, community and societal core skills and competences, and

by adopting a competence-based approach in curriculum reform within a lifelong

learning framework. (Walters, Yang, & Roslander, 2012, p. 45)

The findings from this study corroborated the view that each respective low-income country has not reached the point in which research-based practices were employed to impact student performance by addressing the three dimensions of child variables, home variables, and school variables. More research is needed to identify how teachers, school administrators, and policymakers can better serve and improve student performance in low-income countries through a pragmatic lens of best practices. This study sought to fill the gap, specifically for Rwanda, in the understanding of rural educational practices and student success.

CHAPTER 3

METHODS

The purpose of this study was to understand the educational multi-correlates that may impact academic success factors for children attending a private primary school in Rwanda. The associated research questions are presented below:

1. To what extent do specific child dimensions of chores, health, and hunger impact academic achievement within a Rwandan primary school context?

2. To what extent do specific home dimensions of socioeconomic status, parental education, and parental involvement impact academic achievement within a Rwandan primary school context?

3. To what extent do specific school dimensions of school resources, grade repetition, and school climate impact academic achievement within a Rwandan primary school context?

This chapter is organized into various sections describing methods of the current study, including measurement framework, instrumentation, population, data collection, data preparation, data analysis, and summary.

Measurement Framework

The purpose of this study was to examine how cultural and human resources, or social capital, in a small, Rwandan primary school impacts/influences students' achievement on test scores. The variables derived from the literature on schooling and social capital point to several sources of capital. The sources have been organized into three dimensions that contained sets of related variables. The main constructs and the subsequent educational dimensions for this study

were operationalized as educational multi-correlates. These multi-correlates were derived from the literature on factors affecting academic achievement in low-income countries. The sets of variables were categorized into three constructs consisting of child dimensions, home dimensions, and school dimensions. Each plays an important role in influencing academic achievement. Equally important is the role gender and ethnicity play in influencing student academic achievement couched within the constraints of the research constructs.

The variables selected allowed for the exploration of the impact of the social milieu on children's academic achievement. The theoretical framework as discussed in the previous section allowed for the contextualization of the variables that were explored in the study. Framing the study through the lens of social capital allowed for the identification of variables related to the academic achievement in Rwanda. A conceptual framework also aided in the presentation of the research methods. The need to clarify and represent the conclusions graphically is useful in identifying constructs and operationalizing core themes (Spector, 1992; Tuckman & Harper, 2012). The figure below represents the framework for understanding the interactions between the research questions, multi-correlates, and student test scores.
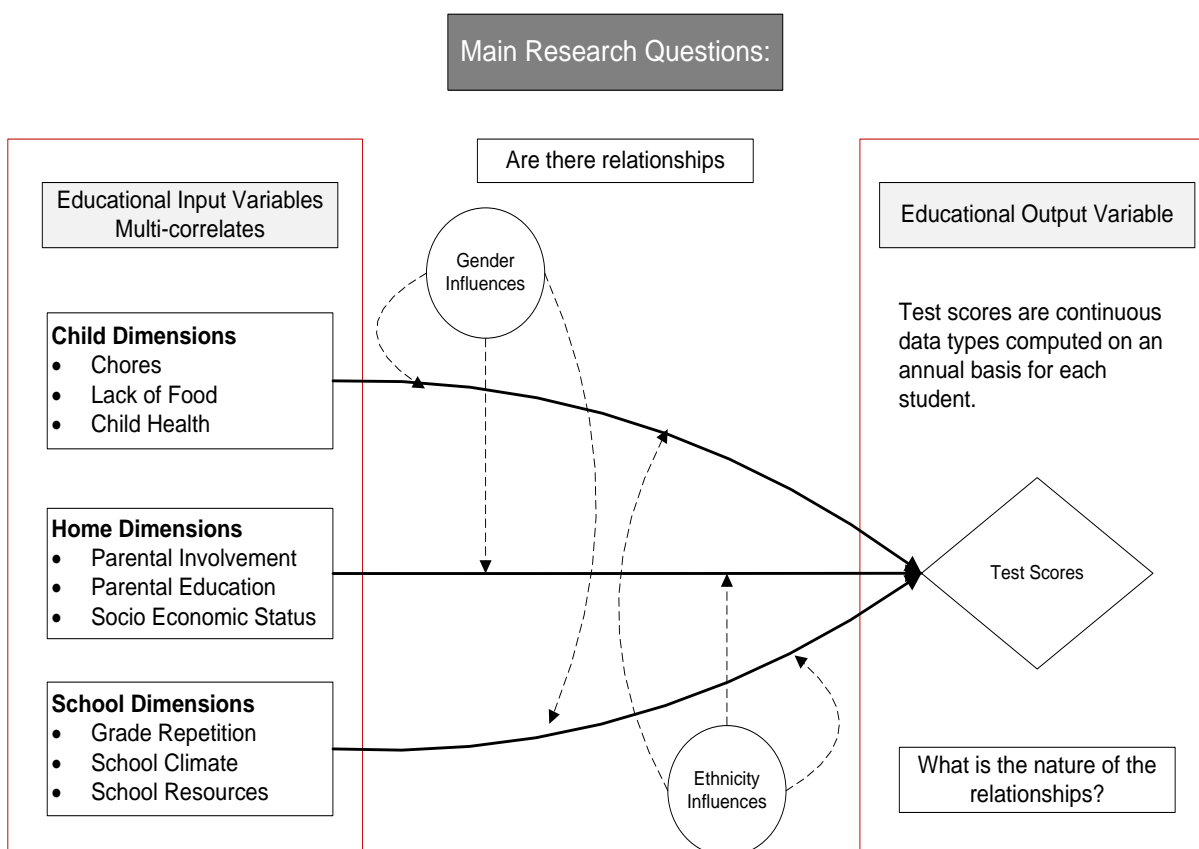
Figure 2. Academic achievement conceptual model

This study utilized correlational (non-experimental) methods, aimed at examining the relationship between the educational inputs for student success and student achievement as measured by the scores on five core subjects consisting of English, Kinyarwanda, Mathematics, Science, and Social Studies. A composite score was created by adding the scores across each subject for the entire year. The composite score served as the dependent variable. Students who attended a local private school in Kagina, Rwanda, were used as the research participants. The overarching goal for the study was to use the results to serve as a platform to add additional voices to the literature and present potential strategies to policymakers to improve school quality and student achievement.

The input variables for this study that were investigated included: (1) Parental Education Level (PEL), (2) Parental Involvement (PINV), (3) Socioeconomic Status (SES), (4) Chores

(CHORES), (5) Lack of Food (HUNGER), (6) Child Physical Health (HEALTH), (7) Child Grade Repetition (GREP), (8) School Resources (RESOURCE), and (9) School Climate (CLIMATE). Furthermore, gender and ethnicity were used to highlight variations across all of the educational multi-correlates. Given the heavy emphasis on girls' schooling around the world, and the impact it has on future well-being, it was important that gender be included in the analysis of student test scores (Colclough et al., 2000; Demie, 2001; Klasen, 2002; LeVine, LeVine, Schnell-Anzola, Rowe, & Dexter, 2011).

In the same way that gender differences were understudied for this specific population in Rwanda, research on ethnic differences and academic achievement in Rwanda and more specifically within Batwa populations was largely missing from academic literature. Since much of the literature focuses on strategies in building schools, obstacles to schooling, and trends in African schooling, not much emphasis has been placed on ethnic differences. Additionally, Africa has been seen as a monolithic entity, a continent with one people, when in actuality many ethnic groups exist. As mentioned in Chapter 1, in Rwanda, ethnic emphasis and differences have been the cause of conflict. That being said, examining disenfranchised groups like the Batwa was important in determining the role that ethnicity plays in students' academic achievement.

Instrumentation

This research examined the relationships between educational multi-correlates and student academic performance. The educational inputs or predictors were derived from three separate dimensions of inquiry that included child dimensions, household dimensions, and school dimensions. These dimensions of inquiry were used to determine the strength in terms of relations and significance based on student achievement outcomes. Survey research was selected as the research methodology for this study because it would provide the data that would then be

statistically analyzed in order to examine the relationships among the variables. Moreover, this methodology allowed the researcher to evaluate the relationships between educational multi-correlates and academic achievement.

In efforts to respond to the research questions, a survey was developed to examine the research constructs. The research design selected for this study employed a survey design to identify, describe, and explain the relationships between educational predictors, identified as independent variables, and the dependent variable of student achievement measured by test scores. This design approach was used to generalize effects based on the nature of relationships and predictive values between variables.

Five-point Likert scales were used for this study that included four sections that aligned with the research constructs. The survey questions were sorted according to the research construct and a common grammar was created in an attempt to make items as readable and consistent as possible. The four sections of the survey instrument consisted of demographic questions, household questions, school questions, and child-centered questions. Each section contained multiple questions, with a total of 45 questions. Numerical categories were developed to assign a higher number code to the response category that had the higher implicit numerical value. The response categories were added up into an overall score for each independent variable. In cases where the scale used negatively worded items, the questions were scaled in reverse. Appendix A shows the specific items in red-colored font that were reverse-coded. This formula was used to accomplish the reversal:

$R = (H + L) - I,$

where R represented the reversal score, H represented the largest number, L represented the lowest number, and I represented the response to the question.

Each construct contained numerous independent variables. The independent variable within each dimension contained multiple survey items. The total summated score for the independent variable was derived to measure against student test scores. Table 1, presented below, identifies the independent variables respectively and their corresponding survey items.

Table 1

Survey Questions by Independent Variable Matrix

	Independent Variables	Question Section and Number
Household Dimensions	Parental Education	HQ1, HQ2
	Parental Involvement	HQ3, HQ4, HQ5, HQ6, HQ7
	SES	BQ2, BQ3A, BQ3B HQ8, HQ9, HQ10, HQ11, HQ12
Child Dimensions	Chores	CQ1, CQ2, CQ3, CQ4, CQ5
	Hunger	CQ6, CQ7, CQ8, CQ9
	Health	CQ10, CQ11, CQ12, CQ13
School Dimensions	School Resources	SQ1, SQ2, SQ3, SQ4, SQ5, SQ6, SQ7
	School Climate	SQ8, SQ9, SQ10, SQ11, SQ12, SQ13, SQ14
	Grade Repetition	CQ14

The three dimensions of inquiry and the subsequent research variables illustrated above were derived from the literature on academic achievement in developing countries. The theoretical constructs, in conjunction with the literature review, were used to develop the scale questions employing the Likert scale format. The new scale and questions supported the research problem by utilizing a quantitative methodology to ascertain the effects between the independent variables and academic achievement. Listed below in Figure 3 are a few samples of the survey questions. The full survey instrument in available in Appendix A.

Household Questions

1. How often does your father help you with school lessons?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

2. How often does your father check over your school work?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

School Questions

1. How often do you use **pencils** at school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

2. How often do you use **notebooks** at school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

Child Questions:

1. How often do you care for animals?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

2. How often do you care for your siblings?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

Figure 3. Sample survey format by research dimension

Survey consultation for this study was conducted with the school headmaster and school faculty. The goal was to identify questions that were problematic for the school staff and to ensure that the research questions were being addressed. The survey was administered and discussed among school staff members face-to-face to increase participation and response rate and to enhance reliability of the responses. "This increases the likelihood that respondents' needs were included in the development of the instrument, in addition to the relevance of the questions" (Bradburn et al., 2004, p. 318). The results from the school staff survey consultation fed directly into the student pilot testing to gauge reliability and relevance. The pilot testing was conducted on 50 students at another private school located in Tanzania. "Pilot testing enables researchers to debug their questionnaire by diagnosing and correcting failings" (Tuckman & Harper, 2012, p.

238). The scale was revised based on feedback from the respondents in order to create a final scaling instrument.

Further improvements were made to the instrument based on the information from the pilot test. To increase response rate and enhance the reliability of the responses, the data collection was done through personal face-to-face question and answer with the respondents. Before the researcher collected the survey responses, permission was granted to conduct research in Rwanda from the Ministry of Education (MINEDUC) Science and Research department. The procedure to get permission from MINEDUC Science and Research department to conduct research in Rwanda required the submission of a full research proposal for approval. In addition, the researcher had to establish an affiliation with a local research institution. Crimson Foundation is registered as an International Non-Governmental Organization (INGO) in Rwanda and met the qualification of an affiliate research institution. Lastly, institutional review board (IRB) approval was granted from the Human Subjects Office of the University of Georgia, to ensure the protection of the rights of the participants. The application process for the IRB approval involved the completion of the application form and the compilation of all required documents, including the approval documents from the primary school that agreed to participate in the study.

Reliability and Validity

Internal consistency was used as a measureable property of items that implied that they measure the same construct. It reflects the extent to which items inter-correlate with one another (Spector, 1992, p. 30). This was important to the researcher because measuring internal consistency helped determine the degree to which specific survey items probe the same construct. This was important especially when using a summated rating scale because the overall summated score was used to establish data point relationships and predictive qualities against student

composite test scores. Preliminary tests of reliability of the data were completed during the pilot study. A Cronbach's alpha score above .70 demonstrates strong reliability within a variable (Cortina, 1993; Nunnally, 1978; Panayides, 2009). However, Cronbach's alpha coefficient of $\geq$ 0.60 was set as the measurement value to estimate the internal consistency of the items. Setting the Cronbach's alpha coefficient at $\geq$ 0.60 ensured that a broader range of input variables were considered to test the internal consistency against the data set and was considered a good benchmark in this study (Rulinda et al.,2013). The data should be derived from a reliable survey. Cronbach's alpha (Cronbach, 1951) were calculated for each independent variable, and the results are presented in Table 2. The computed Cronbach's alpha coefficients significantly illustrated that Parental Involvement, SES, Chores, and School Resource variables maintained internal consistency for the survey items and allowed the researchers to use them for final data gathering. Alternatively, specific variables that included Parental Education, Hunger, Health, and School Climate fell below the threshold for maintaining high internal consistency, and the drawbacks of the continued use of the variables were noted as limitations within the study. Lastly, the independent variable grade repetition was not a measurable component in determining internal consistency of the variable because the survey contained only one question that addressed grade repetition. Internal consistency cannot be measured with one survey item or question.

Table 2

Cronbach's Alpha for Pilot Study

	N = (334)	
Research Constructs	**Cronbach's Alpha**	**Number of Items**
Parental Education	.55	2
Parental Involvement	.64	5
SES	.74	7
Chores	.65	5
Hunger	.52	4
Health	.46	4
School Resources	.76	7
School Climate	.43	7

One of the most difficult aspects of scale development is validation. The overriding question asked in attempting to ensure the validity of the survey was the extent to which the instrument was aligned with the research constructs to include child, home, and school dimensions. Each dimension that included an array of educational multi-correlates was supported in the literature investigating students' academic achievement in low-income countries. Moreover, validity expresses the accuracy of the results of a measurement instrument. "A measuring instrument is valid to the extent to which it measures what it purports to measure" (Huck, 2012, p. 100). Validation presents challenges because the interpretation of scale results occurs. The typical scale-validation strategy involves testing the scale of interest in the context of a set of hypothesized interrelations of the intended construct with other constructs. Based on the research constructs, the survey was generated that targeted specific research questions. For example, several survey items solicited responses regarding the socioeconomic status of families and children. The socioeconomic status was considered a household dimension as supported in the literature. This

procedure was used to ensure that the survey was valid in measuring the research constructs and research questions.

During instrument development, the researcher worked in tandem with school staff to ensure the appropriate language and context was applied to the instrument. The survey was modified based on the feedback and consultation provided between the school staff and researcher. These considerations were made to correctly phrase each question and ensure question specificity was employed to increase content validity, as suggested by Bradburn et al. (2004). Also, the information and responses to the questions were obtained through personal face-to-face interactions, to confirm the accuracy of the data. Where necessary, school records were consulted to triangulate the accuracy of the data set. All of these precautions were taken to ensure the instrument measured the research constructs and thus upheld construct validity.

Research Site and Participants

The research site was an English-based primary school located in the Kamonyi District, Rundi Sector, Kagina cell within Rwanda. The school was located at the top of a mountain, and the nearest hospital was approximately 10 miles away. The Kagina area has experienced rapid growth over the course of the last five years. Local residents and the school had access to electricity, and access to water was rumored to begin soon. There was no central village that encapsulated the geographic region of Kagina, but the students traveled within a 10-mile radius of the school. At the time of the study, the school educated 344 students. The school consisted of one classroom per grade level, and the average teacher/student ratio was one teacher to 57 children. The picture below was taken in June 2014 and shows an aerial photograph of Crimson Academy of Kagina.

Figure 4. Crimson Academy of Kagina, Rwanda

The personnel of the school consisted of two administrators and seven teachers. The regional and racial composition of the school staff consisted of three Rwandese and six Ugandans. In 2008, the Rwandan government changed the entire educational system from French to English (Samuelson & Freedman, 2010). English as the official language of instruction was an evolving practice for Rwandese. Upon Uganda's independence in 1962, English was established as the official language of instruction (Brock-Utne & Skattum, 2009). The historical familiarity in regards to the utilization of English was the deciding factor in hiring more Ugandans as opposed to Rwandans. The children who attended the primary school were the target population for the study. Informed consent was granted from parents of participants. Participation in the research study was voluntary.

Historically, there were three distinct groups or tribes in Rwanda, consisting of the Tutsi, the Hutu, and the Batwa. The government rejected the notion of ethnic classification as a direct result of the 1994 genocide, but it does recognize an undefined group referred to as "historically

marginalized people." For this reason, ethnic classifications at Crimson Academy were not maintained, with the exception of the "historically marginalized people," or the Batwa. Crimson Academy maintained a student body comprising 32% historically marginalized people and 68% other. This distinction between student body compositions served as another point of analysis within the study.

Hayman (2005) reported that Rwanda was "dependent upon external resources to the tune of just under 50% of its overall recurrent budget; and over 95% of the development budget for education came from external resources" (pp. 17-18). The research school site was a private school and received 100% of the funding from US-based support. The school had two funding mechanisms for supporting education for Rwandese. The school solicited student sponsorships from US-based donors. The student sponsorships covered the cost of teacher salaries and basic school supplies. Furthermore, each family of children attending the school participated in the "building program." This program mandated that each parent pay 1,000 Rwandan francs per month, the equivalent of 1.50 USD. This funding stream was specifically used to maintain the existing facility and add new classrooms. The children of the Batwa were excluded from the building program. Given the extreme poverty levels within the population, the potters were not required to participate in the funding program.

A typical day for a child attending school began in the morning at 6:45 am and concluded at 5:00 pm. The students were given a two-hour lunch break from 12:00 pm until 2:00 pm. The majority of the children left the school campus at lunch time. Some of the children actually went home to eat lunch, while the majority did not. According to the headmaster, he suspected that only about a third of the students actually ate lunch, while the remaining ate perhaps one to two meals per day. In addition to the core subjects (English, Kinyarwanda, Mathematics, Science, and Social

Studies), students also participated in additional classes consisting of reading, debate, sports, bible study, games, coaching, and technology. Depending on the grade, science and mathematics were taught in the mornings while the other subjects were taught during the latter part of the school day.

The primary school opened in 2011 and attracted non-traditional school-aged populations because the school was the only one in the entire area. For example, Table 3 shows the average Primary 6 student, which was the equivalent of sixth grade, was 16 years of age in 2013. At the time of the study, there was a student in Primary 6 who was 21 years old. The average age distribution at the school was based on education access and availability. The primary school in Kagina was the only school in the area, and children, pre-adolescents, and teenagers now had access to an education. Each room was filled to capacity as staff tried to limit the number of children in each class.

Table 3

Distribution of Gender and Average Age

Gender and Age Distribution

Grade Level	Primary 1	Primary 2	Primary 3	Primary 4	Primary 5	Primary 6
Average Age	8	9	11	13	16	16
Number of Boys	39	29	34	27	31	9
Number of Girls	28	33	38	37	23	16

Primary 6 had the fewest number of students. As described by the school headmaster, these students represented the inaugural class from when the school first opened. The students faced numerous challenges trying to stay in school and receive an education. Some of the challenges included competing interests for students to work to support families, age of the student, and cultural practices. These impediments were supported in the literature and were often termed as

opportunity costs that impact students' academic achievement for older students (Glick & Sahn, 2000; Kibugi et al., 2013; Hungi & Thuku, 2010a).

In 2013, the school maintained enrollment records to include basic demographic data and attendance records to measure and calculate MINEDUC benchmarks and school performance. The school internal performance as established by MINEDUC included net enrollment, transition rate, repetition rate, dropout rate, and gender enrollment. The rate definitions and calculations were gleaned from the Education Sector Policy (MINEDUC, 2003a). The diagram illustrated in Table 4 below highlights the internal performance indicators achieved over the last several years:

Table 4

School Performance Matrix

	Primary 1		Primary 2		Primary 3		Primary 4		Primary 5		Primary 6		Total	
	Begin	End	Begin	End	Begin	End	Begin	End	Begin	End	Begin	End	Begin	End
Enrollment 2011	65	65	47	49	32	35	27	27					171	176
Transition 2011	65	59	47	48	32	32	27	27					171	166
Repetition Rate 2011	65	6	47	1	32	3	27	0					171	10
Dropout Rate 2011	65	0	47	0	32	0	27	0					171	0
Enrollment 2012	72	70	69	66	58	53	48	44	36	29			283	262
Transition 2012	72	51	69	47	58	30	48	34	36	18			283	180
Repetition Rate 2012	72	19	69	18	58	23	48	10	36	11			283	81
Dropout Rate 2012	72	2	69	4	58	5	48	4	36	7			283	22
Enrollment 2013	53	51	62	61	61	61	49	45	49	45	16	15	290	278
Transition 2013	53	35	62	53	61	47	49	31	49	24	16	15	290	205
Repetition Rate 2013	53	16	62	7	61	14	49	14	49	21	16	0	290	72
Dropout Rate 2013	53	2	62	2	61	0	49	4	49	4	16	1	290	13
Enrollment 2014	66	61	62	60	72	68	64	62	54	52	26	26	344	329
Transition 2014	66	38	62	41	72	48	64	44	54	36	26	26	344	233
Repetition Rate 2014	66	19	62	18	72	21	64	18	54	16	26	26	344	92
Dropout Rate 2014	66	9	62	3	72	3	64	2	54	2	26	26	344	19

	2011	2012	2013	2014
Net Enrollment	111%	99%	96%	96%
Transition Rate	97%	63%	71%	68%
Repetition Rate	6%	29%	25%	27%
Dropout Rate	0%	8%	4%	5%
Gender Enrollment				
Males	89	134	147	147
Females	82	149	143	143

Gender Parity Index is the ratio of females to males of a given indicator; it measures gender equality between girls' and boys' enrollment in primary school.

Completion Rate is the number of new entrants in the last year of primary school in a given year, expressed as a percentage of the total number of population having official age for being in the last year of primary school.

Transition Rate is the number of new pupils entering a given level of education as a percentage of the pupils who were last year at the end of previous level. Only new pupils entering the next level of education are given consideration; repeaters at this level are eliminated.

Dropout Rate is the percentage of pupils who leave the school without completing the grade they were in during the school year. Dropout rate can also be obtained by subtracting the sum promotion rate and repetition rate from 100 in the given school year.

Repetition Rate is the proportion of pupils enrolled in a given grade and a given school year who study in the same grade the following school year.

Although the school was a private primary school and maintains autonomy to develop instructional content, the curriculum at the research site or school was based on national standards developed by MINEDUC. The curriculum covered five subjects including English, Kinyarwanda (native language), Mathematics, Science, and Social Studies. The language of instruction was both Kinyarwanda and English. The younger children who attended the school received some instruction in Kinyarwanda. The older students, beginning with Primary 3, received a majority of instruction in English, according to the school headmaster. The school was the only English-based school in the region. In late 2013, the first graduating class participated in National Exams and each child passed. In addition, 10 of the graduates scored in the top 10% while the remaining five

students scored between the top 10th through the 25th percentiles. The graduating class was the top-performing school in the Kamonyi District based on National Exams for graduates in 2013. The mandatory sector-wide tests indicated that the overall student body is the top-performing school in the Rundi Sector in 2013.

As discussed in the literature, separate restroom facilities by gender, the use and availability of electricity, the availability of water, and classroom supplies have been linked with resources of a quality school (Colclough et al., 2000; Hanushek et al., 2008; Hungi & Thuku, 2010a; Lloyd et al., 2000). Crimson Academy of Kagina, Rwanda, possessed each one the aforementioned school quality criteria as discussed in the literature on schooling in low-income countries. In addition, the teaching staff regularly participated in professional development activities, utilized approved lesson plans that are linked to national standards, and possessed teaching degrees. These criteria have also been associated with maintaining quality teachers (Hardman et al., 2012; Otienoh, 2010; Pelini, 2009). Based on the level of instruction, facilities, and school performance on national exams, the school and teachers exceeded national norms for rural primary schools in Rwanda.

The research participants for this study adequately addressed the research study constructs as identified by the research questions. The study investigated one primary school located in Rwanda. The participants of the study were the students who attended the school. The research site or school was required to provide data to MINEDUC that determined and reported on whether or not the school and students were performing based on the national benchmarks. The target population allowed the researcher to directly answer the research questions. Likewise, by collecting student achievement data from school records and by collecting survey responses, the researcher applied statistical methodologies to draw correlations and determine levels of impact.

The analysis directly answered the research questions in identifying variables that affect student achievement in a Rwandan primary school.

According to Huck (2012), generalizability is an important concept in research that relates to the application of the research to populations outside those specifically sampled. The results of this study may be generalized for two reasons. First, the sample size was quite large. Most studies with sample sizes greater than 30 participants are viewed as large enough to generalize the results to other populations. The number of participants in this study was more than 10 times 30 individuals, so at over 300 participants, the study had enough power in analyses to generalize the results. Second, the study employed non-experimental methods. Since the researcher had less control over the participants in the study, it was more likely that the actions of the participants were valid as were their responses to the survey. As a result, it can be ascertained that the results of the statistical analyses were sound representations of the views of the broader population. Although the results of this study can be generalized to broader populations, it is important to note that this study consisted of male and female primary school students in Eastern Africa. The results of this study can be generalized to similar populations. Different populations may be subjected to extraneous variables that were not included in this study. Consequently, the results of studies with vastly different populations may lead to vastly different results and conclusions. Additionally, since this was a non-experimental study, it must be noted that the factors related to academic achievement were only related to the outcome; they do not cause the outcome.

Lastly, the central goal of the study was to add to the literature of academic achievement factors and their effects on children in Rwanda. The purpose of the study was also to guide and inform the research constructs centered on the target population consisting of Rwandan school-

aged children. The data collection and measures created for this study adequately aligned with the purpose of this study.

Data Collection and Preparation

There were several data types, including test scores, school records, and a survey, that were used to answer the research questions.

School Records and Test Scores

Academic achievement, the dependent variable, was measured using school records and test scores. The research questions examined components of academic achievement in relationship to independent variables. This was accomplished by examining school records. The school records consisted of teacher grade books in five core subjects of English, Kinyarwanda, Mathematics, Science, and Social Studies. The grade book contained two separate test scores within each core subject per term. The two separate test scores were averaged and recorded as the final test score per term per subject. At the end of the academic year January to November, a student was issued a report card with 15 separate test scores. All the scores for any given participant were aggregated into a single test score output variable. See the example test scores of a child attending the primary school in Kagina in 2013 presented below in Table 5.

Table 5

Sample Test Score Matrix

Student Name	Grade Level	Year	Course	Term 1	Term 2	Term 3
			English	86	72	85
			Kinyarwanda	63	69	54
Sample Student	Primary 1	2013	Mathematics	80	65	82
			Science	98	92	96
			Social Studies	98	91	94

The results of the test scores were maintained within the school and were used to quantify student achievement in school. The researcher's role was to collect the test scores and perform

analysis for the study. The test scores were inputted first into a spreadsheet and uploaded into a virtual database for storage by the researcher. The virtual database maintains user credentialing functionality to restrict access to the database administrator. This feature was important to ensure confidentiality. Correlations were determined in addition to using descriptive statistics to describe participant achievement in terms of test scores.

The school maintained additional data that were used in the research study. The school maintained records to track student demographic data, attendance, and enrollment records. The school also kept track of school-wide performance indicators such as repetition, dropout, completion, and transition rates. The researcher collected each data point in a spreadsheet. The spreadsheet was then inputted into a virtual database for storage. The virtual database maintains user credentialing functionality to restrict access to the database administrator. This feature was important to ensure confidentiality.

Survey Administration

The participants were asked to complete the survey. The Crimson Foundation legal representative/research assistant in Rwanda administered all the surveys to ensure consistency of survey procedures. In an effort to reduce researcher bias, researchers often use mechanisms to limit researcher partiality. For example, in this study, the researcher only handled data with no participant identifiable information linking respondents to the survey instrument. In an effort to reduce bias in this study, the data were collected by the research assistant. Each participant was assigned a number, and in doing so, the participants were stripped of information that could expose their true identity. In addition, the research assistant implemented procedures to mitigate social desirability bias. Methods for establishing rapport, putting respondents at ease, and appearing non-judgmental (Bradburn et al., 2004) were employed by the research assistant. The survey was

written in the native language of Kinyarwanda. The research assistant read each question for all participants and marked the responses directly into an electronic version of the survey. The administration of the survey was conducted individually in a separate room to remove distractions and ensure confidentiality. All child identifiable characteristics such as child's name were not included on the survey to ensure anonymity. A coding scheme was devised to create a unique identifier for each student. The unique identifier was used to match student test scores with student survey responses. The average survey took approximately 30 minutes to complete per respondent.

Through this data collection process, 334 surveys were returned for use in the study, which was the equivalent to a 97% response rate. Surveys that contained missing or no responses to specific survey questions were removed from the study sample. Of the total 344 surveys, ten were deemed unusable due to blank responses on the questionnaire. This resulted in 334 usable questionnaires.

Data Preparation

The data set was examined for unusable data. This examination revealed a number of responses of 0. For the three theoretical constructs, a score of 0 meant "not applicable." Scores of 0 were recoded as "system-missing" so as to not artificially reduce the means. Upon careful reflection, further use of the "not applicable" category were kept to a strict minimum, as many cases in the study were eliminated from analysis due to an incomplete data set resulting from the recoding of 0 scores as system-missing. For example, when asking a question about a father who was deceased, the question was answered with a "0."

The frequency, means, and standard deviation for each item on the questionnaire were calculated. Descriptive statistics were reviewed to ensure the range of responses were appropriate in light of the intended responses.

Data Analysis

Data analysis was conducted using SPSS version 22. Appropriate statistical analyses were selected to answer the following research questions: (1) To what extent do specific child dimensions of chores, health, and hunger impact academic achievement within a Rwandan primary school context? (2) To what extent do specific home dimensions of socioeconomic status, parental education, and parental involvement impact academic achievement within a Rwandan primary school context? and (3) To what extent do specific school dimensions of school resources, grade repetition, and school climate impact academic achievement within a Rwandan primary school context? Descriptive statistics, correlations, and multiple regression were used to analyze the data. Pearson's coefficients were used to underscore both the directionality and the relative strength of linear relationships between variables. Whereas multiple regression was used to explain the predictive qualities of the independent variables as measured against student test scores. Lastly, the analysis of the data set was organized and reported by gender and ethnicity.

Correlations

Since the study was based on three distinct dimensions of inquiry and a series of independent variables within each domain, statistical correlation was performed as an approach to measure the nature of the relationships between variables. This analysis tool allowed the researcher to answer the research questions by gauging the extent to which relationships exist between variables. Pearson's *r* Product-Moment was used to measure the relationship between the educational multi-correlates and students' academic achievement. Pearson's product correlations are useful when examining continuous variables. The alpha level for significance test was set at the .01 level and 0.05 levels.

Within this study, both students' test scores and the summated survey instrument raw scores were treated as continuous variables. The statistical tool was useful in answering the research questions by allowing the computations of relative relationship variability. The correlations were discussed, based on the extent to which (1) the three measures of household factors impacted student academic achievement; (2) the three measures of school factors impacted student academic achievement; and (3) the three measures of child factors impacted student academic achievement.

Multiple Regression

Multiple regressions were applied as a useful tool to explain or make predictions between several independent variables and one dependent variable. The composite test score across all academic subjects was used as the dependent variable and the educational multi-correlates were used as the dependent variables in the multiple regression model. This study applied the simultaneous multiple regression model, where the specific order in which data on the independent variables were considered at the same time. This approach was used to illustrate predictive variables that work simultaneously to impact the dependent variable of student test scores. Multiple regression analyses were performed positing that educational multi-correlates served as predictive variables affecting student test scores based on the research constructs and questions. This analysis tool allowed the researcher to directly answer the research questions by quantifying the level of impact as they related to the predictive qualities between educational multi-correlates and students' academic achievement.

Moreover, the regression coefficients for the independent variables demonstrated how much the predicted value for the outcome variables changed positively or negatively. This was important in determining the level of impact as noted in the research questions. All remaining

variables that did not predict directionality were removed from further analysis. This way, the unique contribution of each predictor variable to the outcome variable was determined. Furthermore, multiple regression was used to help answer the research questions by determining the predictive nature of the impact of the educational multi-correlates across students' achievement. The multiple regressions were discussed, based on the extent to which (1) the three measures of household factors impacted student academic achievement; (2) the three measures of school factors impacted student academic achievement; and (3) the three measures of child factors impacted student academic achievement.

The regression formula for the **child dimension** analysis is $\mathbf{Y = a + b_1\,X_1 + b_2\,X_2 + b_3\,X_3}$

> whereby
>
> Y = Student Test Scores
>
> a (alpha) is the constant or intercept
>
> b_1 is the slope (Beta coefficient) for X_1
>
> X_1 is the first independent variable "Chores" that is explaining the variance of Y
>
> b_2 is the slope (Beta coefficient) for X_2
>
> X_2 is the second independent variable "Hunger" that is explaining the variance of Y
>
> b_3 is the slope (Beta coefficient) for X_3
>
> X_3 is the first independent variable "Health" that is explaining the variance of Y

The regression formula for the **home dimension** analysis is $\mathbf{Y = a + b_4\,X_4 + b_5\,X_5 + b_6\,X_6}$

> whereby
>
> Y = Student Test Scores
>
> a (alpha) is the constant or intercept
>
> b_4 is the slope (Beta coefficient) for X_4
>
> X_4 is the first independent variable "Parental Education" that is explaining the variance of Y
>
> B_5 is the slope (Beta coefficient) for X_5
>
> X_5 is the second independent variable "Parental Involvement" that is explaining the variance of Y

B_6 is the slope (Beta coefficient) for X_6

X_6 is the first independent variable "SES" that is explaining the variance of Y

The regression formula for the **school dimension** is $Y = a + b_7 X_7 + b_8 X_8 + b_9 X_9$

whereby

Y = Student Test Scores

a (alpha) is the constant or intercept

b_7 is the slope (Beta coefficient) for X_7

X_7 is the first independent variable "Grade Repetition" that is explaining the variance of Y

B_8 is the slope (Beta coefficient) for X_8

X_8 is the second independent variable "School Resources" that is explaining the variance of Y

B_9 is the slope (Beta coefficient) for X_9

X_9 is the first independent variable "School Climate" that is explaining the variance of Y

Summary

The purpose of this study is to investigate and explain the relationships between a series of input variables and measures of academic achievement as output variables. The methodological framework for the study is described to include research design rationale, and a description of the research site and participants. Furthermore, identification of instrumentation and data collection procedures and statistical measurement approaches were discussed to address the research questions. The next two chapters present the results, findings, interpretation, discussions, and conclusions from the study. Chapter 4 presents the results of the quantitative data collected and separated by gender and ethnicity. Chapter 5 presents a discussion of the results, the conclusions, recommendations, and suggestions for further consideration and future research.

CHAPTER 4

RESULTS

Descriptive statistics, Pearson's correlation, and multiple regression analysis were used to answer the three research questions. Descriptive statistics (means and standard deviations) were derived for the three main constructs to include household dimensions, school dimensions, and child dimensions. Each dimension contained several educational multi-correlates that were analyzed and reported by gender and ethnicity to highlight descriptive differences. In addition, frequency analysis was performed. The frequency histogram of each independent variable is located in Appendix D.

A correlation coefficient is an index of the strength of the linear association between variables. A correlation matrix was created across all of the educational multi-correlates to ascertain the relative relational strength between variables. The correlational matrices were delineated by the three key research constructs that included child dimensions, home dimensions, and school dimensions. In addition, the correlations were analyzed and reported by gender and ethnicity. The correlational matrices for each research construct were reported as significant at the .01 level and .05 levels.

Multiple regressions were applied with the student test score identifier as the outcome variable and parental education, parental involvement, SES, chores, hunger, health, grade repetition, school resources, and school climate as predictor variables. The standardized partial regression coefficients tell how much the predicted value for the outcome variables changed either positively or negatively with a unit change in a predictor variable with other predictor variables.

This way, the unique contribution of each predictor variable to the outcome variable was determined.

Multiple regressions analyses were separately applied to each group, that is, boy and girl for gender, and Batwa and Rwandan for ethnicity. The results are reported in the proceeding section. The Statistical Package for the Social Sciences (SPSS ver. 22) was utilized to perform all analyses. The following outlines data analysis results for each research question.

Research Question 1: Child Dimension Results

Research Question 1: To what extent do specific child dimensions of chores, health, and hunger impact academic achievement within a Rwandan primary school context?

A descriptive analysis was done first on the data in order to assess the descriptive qualities of the variables and provide a summary of the data. Statistical analysis also included a correlation matrix and multiple regression analysis for each variable within the child dimension research construct. The summary of the following continuous independent variables chores, health, and hunger contained within the child dimension construct are described and reported for each gender and ethnicity.

Child Dimension: Descriptive Statistics by Gender

Some of the differences between male and female students were noteworthy based on the descriptive statistics of the child dimension variables analyzed by gender, as Table 6 suggests by looking at the mean results between male and female students. The number of participants in the study for boys and girls was exactly the same. The independent variables within the child dimension included chores, hunger, and health and were discussed in more detail in Chapter 3. Each calculated mean was based on the summation of the survey questions as indicated in Table 1 for each independent variable. For example, the calculated mean for the independent variable

chores was a compilation of five survey questions utilizing a Likert format, meaning the minimum reported score for chores was 0 and the maximum was 25. The dependent variable student test scores was a composite number derived from the summation of five individual academic subject test results in English, Kinyarwanda, Math, Science, and Social Studies. Girls were reported to have nearly the same mean score as compared to boys for overall student test scores. The mean test score for male students was 344.68 (N = 167, SD = 110.15), and the mean test score for female students was 345.99 (N = 167, SD = 101.31).

There were differences in the calculated mean values between boys and girls. For example, the mean score for household chores for male students was 16.05 (N = 167, SD = 3.23), and the mean score for household chores for female students was 16.74 (N = 167, SD = 2.89). Likewise, the mean score for child hunger for male students was 13.03 (N = 167, SD = 2.57), and the mean score for child hunger for female students was 13.82 (N = 167, SD = 2.16). The mean differences between male and female students measured against the child dimension of health was also small, reporting male student results as 10.60 (N = 167, SD = 1.82) and female student results as 10.69 (N = 167, SD = 1.73).

Table 6

Descriptive Statistics on Child Dimension Variables by Gender

Descriptive Statistics for Male Students (N=167)

	Minimum	Maximum	Mean	Std. Deviation
Test Scores	74	499	344.68	110.15
Chores	0	25	16.05	3.23
Hunger	0	18	13.03	2.57
Health	0	16	10.60	1.82

Descriptive Statistics for Female Students (N=167)

	Minimum	Maximum	Mean	Std. Deviation
Test Scores	77	499	345.99	101.31
Chores	9	23	16.74	2.89
Hunger	1	18	13.82	2.16
Health	6	16	10.69	1.73

Child Dimension: Descriptive Statistics by Ethnicity

The calculated mean differences between Batwa and Rwandan students, as illustrated in Table 7, were more noticeable as compared to the reported descriptive statistics results based on gender. The total number of participants in the study was 334 students. There were 106 Batwa students that participated in the study, the equivalent of 32% of the overall population. The remaining students within the study consisted of 228 Rwandan students, the equivalent of 68% of the overall participants in the research.

Table 7 reports the mean values, standard deviations, minimum and maximum scores based on the ethnicity of the population. For instance, Batwa students were likely to score lower on the dependent cumulative variable student test scores than Rwandan students. The mean test score for Batwa students was 302.15 (N = 106, SD = 106.93), while the mean test score for Rwandan students was 365.41 (N = 228, SD = 99.07). The mean test score for Rwandan students was 17%

higher as compared to their Batwa counterparts. The percent difference was calculated by dividing

the mean test score for Batwa students by the mean test score for Rwandan students. Of the three

variables included in the child dimension construct, a greater difference was reported for hunger

by ethnicity. The mean score measured against hunger for Batwa students was 12.81 (N = 106, SD

= 2.75), and the mean score for Rwandan students was 13.71 (N = 228, SD = 2.16). This indicated

that Batwa students reported to eat less than their class peers by 7 percent. There were also

minimal differences in the mean scores for chores and health for Batwa students. For Batwa

students, the mean scores for chores and health were 16.82 (N = 106, SD = 3.38) and 10.81 (N =

106, SD = 2.17), respectively. For Rwandan students, the mean score for chores was 16.20 (N =

228, SD = 2.92) and for health was 10.57 (N = 228, SD = 1.55).

Table 7

Descriptive Statistics on Child Dimension Variables by Ethnicity

Descriptive Statistics for Batwa Students (N=106)

	Minimum	Maximum	Mean	Std. Deviation
Test Scores	77	498	302.15	106.93
Chores	0	23	16.82	3.38
Hunger	0	18	12.81	2.75
Health	0	16	10.81	2.17

Descriptive Statistics for Rwandan Students (N=228)

	Minimum	Maximum	Mean	Std. Deviation
Test Scores	74	499	365.41	99.07
Chores	9	25	16.20	2.92
Hunger	1	18	13.71	2.16
Health	7	16	10.57	1.55

Child Dimension: Correlation by Gender

A correlation matrix was devised based on the independent variables chores, hunger, and health and the dependent variable of student summated test scores across five subjects. The number of participants was 334 and was equally divided between male and female, at 167 each. The correlations were reported as significant at the .01 level and .05 levels. Although Pearson correlation coefficients were calculated for all the educational multi-correlates including students' test scores, the results are reported based on the relationship between student test scores and each of the independent variables. In addition, the analysis of the data was reported by of gender and ethnicity.

Table 8 reports that male student test scores were negatively correlated with hunger (r = -.29). In addition, for male students, student test scores were positively correlated with health (r = .24). Female student test scores were negatively correlated with chores (r = -.29) and hunger (r = -.23). Furthermore, for female students, student test scores were positively correlated with health (r = .40). The independent variable of health impacted female students test scores greater than male student test scores.

Table 8

Correlations on Child Dimension Variables by Gender

Correlations for Male Students (N = 167)			
	Hunger	Health	Test Scores
Chores	.21[**]	.23[**]	-.14
Hunger	-	-.05	-.29[**]
Health		-	.24[**]

*p < 0.05, **p < 0.01

Correlations for Female Students (N = 167)			
	Hunger	Health	Test Scores
Chores	0	.06	-.29[**]
Hunger	-	-.30[**]	-.23[**]
Health		-	.40[**]

*p < 0.05, **p < 0.01

Child Dimension: Correlation by Ethnicity

A correlation matrix was developed to report the independent variables chores, hunger, and health and the dependent variable student summated test scores across all subjects by ethnicity. The number of participants that were identified as Batwa was 106. The number of participants that were identified as Rwandan was 228. The correlations were reported as significant at the .01 level and .05 levels. Although Pearson correlation coefficients were calculated for all the educational multi-correlates including students' test scores, the results are based on the relationship between student test scores and each of the independent variables. Furthermore, the analysis of the data was reported by gender and ethnicity.

The results as illustrated in Table 9, reported Batwa student test scores were significantly correlated negatively with hunger (r = -.32) and positively correlated with health (r = .31).

Rwandan student test scores were significantly correlated negatively with hunger (r = -.16) and

chores (r = -.20). For Rwandan students, test scores were significantly correlated positively with

health (r = .31). The independent variable hunger significantly correlated negatively with student

test scores for both Batwa and Rwandan students. The independent variable health significantly

correlated positively with student test scores for both Batwa and Rwandan students.

Table 9

Correlations on Child Dimension Variables by Ethnicity

Correlations for Batwa (N = 106)			
	Hunger	Health	Test Scores
Chores	.41**	.19	-.16
Hunger		-.03	-.32**
Health			.31**

$*p < 0.05, **p < 0.01$

Correlations for Rwandan (N = 228)			
	Hunger	Health	Test Scores
Chores	-.02	.12	-.20**
Hunger		-.24**	-.16*
Health			.31**

$*p < 0.05, **p < 0.01$

Child Dimension: Multiple Regression by Gender

Several independent variables were explored to predict their impact on student academic

performance as shown in Table 10. The independent variables chores (β = -.17, t = -2.18, p < .05)

and hunger (β = -.31, t = -4.20, p < .05) were significant predictors of lower male student test

scores. Alternatively, health (β = .18, t = 2.44, p < .05) was a significant predictor of higher male

student test scores. For female students, there were a number of factors that influenced test scores, including household chores (β = -.27, t = -3.88, p < .05) and health (β = .35, t = 4.84, p < .05). Alternatively, the independent variable hunger did not significantly predict student test scores for female students at the .05 level. The specific multiple regression formula was discussed in Chapter 3.

Table 10

Regression on Child Dimension Variables by Gender

Regression Coefficients for Male Students (N = 167)

Dependent Variables	Beta	T	Sig.
Chores	-0.17	-2.18	0.03
Hunger	-0.31	-4.20	0.00
Health	0.18	2.44	0.02

Regression Coefficients for Female Students (N = 167)

Dependent Variables	Beta	T	Sig.
Chores	-0.27	-3.88	0.00
Hunger	-0.13	-1.82	0.07
Health	0.35	4.84	0.00

Child Dimension: Multiple Regression by Ethnicity

The next set of tables and results is delineated by ethnicity to include Batwa and Rwandan students. There were several independent variables that predicted the dependent variable of student performance for this study. The results in Table 11 show that the independent variables chores (β = -.30, t = -3.10, p < .05), hunger (β = -.43, t = -4.63, p < .05), and health (β = .25, t = 2.84, p <

.05) did significantly predict test scores for Batwa students. In contrast, the independent variables chores (β = -.166, t = -2.65, p < .05) and health (β = .26, t = 4.07, p < .05) significantly predicted test scores for Rwandan students. The remaining independent variable hunger (β = -.10, t = -1.51, p < .05) did not significantly predict test scores for Rwandan students.

Table 11

Regression on Child Dimension Variables by Ethnicity

Regression Coefficients for Batwa Students (N = 106)

Dependent Variables	Beta	t	Sig.
Chores	-0.30	-3.10	0.00
Hunger	-0.43	-4.63	0.00
Health	0.25	2.84	0.00

Regression Coefficients for Rwandan Students (N = 228)

Dependent Variables	Beta	t	Sig.
Chores	-0.17	-2.65	0.00
Hunger	-0.10	-1.51	0.13
Health	0.26	4.07	0.00

Research Question 2: Home Dimension Results

Research Question 2: To what extent do specific home dimensions of socioeconomic status, parental education, and parental involvement impact academic achievement within a Rwandan primary school context?

Home Dimension: Descriptive Statistics by Gender

The independent variables within the home dimension, parental education, parental involvement, and socioeconomic status (SES), are discussed in more detail in Chapter 3. The dependent variable student test scores was a composite number derived from the summation of five individual academic subject test results in English, Kinyarwanda, Math, Science, and Social Studies. Each calculated mean was based on the summation of the survey questions as indicated in Table 1 for each independent variable. For example, the calculated mean for the independent variable parental education was a compilation of two survey questions utilizing a Likert format, meaning the reported minimum score for parental education was 2 and the maximum was 10. Table 12 indicates difference between the mean score for parental education for male students calculated at 5.51 (N = 167, SD = 1.66), and the mean score for parental education for female students at 5.52 (N = 167, SD = 1.88). Likewise, there is minimal 1 percent difference between the mean score for socio-economic status for male students at 20.17 (N = 167, SD = 6.17) and the mean score for socio-economic status for female students at 20.46 (N = 167, SD = 5.52). In contrast, for the parental involvement variable, the results showed more variation in the mean score for male students at 12.67 (N = 167, SD = 3.24) and the mean score for parental involvement for female students at 13.25 (N = 167, SD = 3.62). The results show that parents showed more involvement with female students than male students.

Table 12

Descriptive Statistics on Home Dimension Variables by Gender

Descriptive Statistics for Male Students (N = 167)

	Minimum	Maximum	Mean	Std. Deviation
Parental Education	2	9	5.51	1.66
Parental Involvement	5	23	12.67	3.24
SES	6	33	20.17	6.17

Descriptive Statistics for Female Students (N = 167)

	Minimum	Maximum	Mean	Std. Deviation
Parental Education	2	10	5.52	1.80
Parental Involvement	7	25	13.25	3.62
SES	7	33	20.46	5.52

Home Dimension: Descriptive Statistics by Ethnicity

There was a difference between the mean test score for parental education for Batwa students at 5.03 (N = 106, SD = 1.52) and the mean score for Rwandan students at 5.74 (N = 228, SD = 1.78), as shown in Table 13. Batwa students were less likely to have educated parents than were Rwandan students. Likewise, there was a difference between the mean test score measured against parental involvement for Batwa students at 12.22 (N = 106, SD = 3.08) and the mean test score for Rwandan students at 13.30 (N = 228, SD = 3.56). The most noteworthy difference based on ethnicity was the mean test score on the independent variable socio-economic status. The mean test score measured against SES for Batwa students was 16.58 (N = 106, SD = 5.66) while the mean test score for Rwandan students was 22.05 (N = 228, SD = 5.07). Based on the mean

difference between Batwa and Rwandan students, Batwa students were 25% less likely to have the

economic capital or resources in comparison to their Rwandan peers.

Table 13

Descriptive Statistics on Home Dimension Variables by Ethnicity

Descriptive Statistics for Batwa Students (N = 106)

	Minimum	Maximum	Mean	Std. Deviation
Parental Education	2	9	5.03	1.52
Parental Involvement	5	19	12.22	3.08
SES	6	29	16.58	5.67

Descriptive Statistics for Rwandan Students (N = 228)

	Minimum	Maximum	Mean	Std. Deviation
Parental Education	2	10	5.74	1.78
Parental Involvement	7	25	13.3	3.56
SES	9	33	22.05	5.07

Home Dimension: Correlation by Gender

Table 14 shows that male student test scores were positively correlated with SES ($r = .34$).

Male student test scores show little to no correlation with parental education ($r = -.04$) and parental

involvement ($r = -.01$). Female test scores were significantly correlated positively with SES ($r =$

$.35$). This indicates that for both male and female students, the socioeconomic status of families

positively correlated with academic achievement. Interestingly, female student test scores were

significantly correlated negatively with parental involvement ($r = -.29$). The contrasting finding

of female students having a negative correlation with parental involvement may highlight a potential area for further research. Female test scores were not significantly correlated with parental education (r = .02).

Table 14

Correlations on Home Dimensions Variables by Gender

Correlations by Male (N = 167)			
	Parental Involvement	SES	Student Test Scores
Parental Education	.37**	.20*	-.04
Parental Involvement	1	.05	-.01
SES		1	.34**

*p < 0.05, **p < 0.01

Correlations by Female (N = 167)			
	Parental Involvement	SES	Student Test Scores
Parental Education	.34**	.36**	.02
Parental Involvement	1	.02	-.29**
SES		1	.35**

*p < 0.05, **p < 0.01

Home Dimension: Correlation by Ethnicity

Table 15 shows that Batwa student test scores were significantly correlated positively with SES (r = .27). Batwa student test scores were not significantly correlated with parental education (r = -.16) and parental involvement (r = -.15). Rwandan student test scores were significantly correlated positively with SES (r = .25). However, Rwandan student test scores were significantly correlated negatively with parental involvement (r = -.23). Rwandan student test scores were not

correlated with parental education (r = -.02). SES correlated with test scores for both the Batwa and the Rwandan students. For the Batwa, the highest correlate with test scores was SES. For the Rwandans, the highest correlates were SES and parental involvement.

Table 15

Correlations on Home Dimension Variables by Ethnicity

Correlations for Batwa Students (N = 106)			
	Parental Involvement	SES	Student Test Scores
Parental Education	.27**	.04	-.16
Parental Involvement	-	-.01	-.15
SES		-	.27**

*p < 0.05, **p < 0.01

Correlations for Rwandan Students (N = 228)			
	Parental Involvement	SES	Student Test Scores
Parental Education	.35**	.30**	-.02
Parental Involvement	-	0	-.23**
SES		-	.25**

*p < 0.05, **p < 0.01

Home Dimension: Regression by Gender

Several independent variables were explored to predict their impact on student performance as shown in Table 16. Parental education and parental involvement were not significant predictors of higher male student test scores. For male students, the independent variable SES significantly predicted higher student test scores ($\beta = .36$, t = 4.85, p < .05). For female students, there were a number of factors that influenced test scores, including parental

involvement (β = -.29, t = -3.98, p < .05) and socioeconomic status (β = .35, t = 4.70, p < .05). The independent variable parental education did not predict higher test scores for female students (β = -.00, t = -.07, p < .05).

Table 16

Regression on Home Dimension Variables by Gender

Regression Coefficients for Male Students (N = 167)

Dependent Variables	Beta	t	Sig.
Parental Education	-0.11	-1.39	0.17
Parental Involvement	0.01	0.17	0.87
SES	0.36	4.85	0.00

Regression Coefficients for Female Students (N = 167)

Dependent Variables	Beta	t	Sig.
Parental Education	-0.00	-0.07	0.95
Parental Involvement	-0.30	-3.98	0.00
SES	0.35	4.70	0.00

Home Dimension: Regression by Ethnicity

Table 17 delineates the results by ethnicity to include Batwa and Rwandan students. There were several independent variables that predicted student performance for this study, including parental education and parental involvement. However, SES (β = .27, t = 3.84, p < .05) did significantly predict test scores for Batwa students. For Rwandan students, the independent variables parental involvement and socioeconomic status (SES) did significantly predict test scores

($\beta = -.22$, $t = -3.19$, $p < .05$ and $\beta = .26$, $t = 3.84$, $p < .05$, respectively). The independent variable parental education did not significantly predict student test scores.

Table 17

Regression on Home Dimension Variables by Ethnicity

Regression Coefficients for Batwa Students (N = 106)

Dependent Variables	Beta	t	Sig.
Parental Education	-0.15	-1.51	0.14
Parental Involvement	-0.09	-0.88	0.38
SES	0.27	2.82	0.00

Regression Coefficients for Rwandan Students (N = 228)

Dependent Variables	Beta	t	Sig.
Parental Education	-0.02	-0.33	0.74
Parental Involvement	-0.22	-3.19	0.00
SES	0.26	3.84	0.00

Research Question 3: School Dimension Results

Research Question 3: To what extent do specific school dimensions of school resources, grade repetition, and school climate impact academic achievement within a Rwandan primary school context?

School Dimension: Descriptive Statistics by Gender

The independent variables within the school dimension, grade repetition, school resources, and school climate, are discussed in more detail in Chapter 3. The dependent variable of student test scores was a composite number derived from the summation of five individual academic subject test results in English, Kinyarwanda, Math, Science, and Social Studies. Each calculated mean was based on the summation of the survey questions as indicated in Table 1 for each independent variable. For example, the calculated mean for the independent variable school resources was a compilation of seven survey questions utilizing a Likert format, meaning the reported minimum scores for school resources was 18 and the maximum was 33. The results in Table 18 indicate differences between the male and female participants within the study. Virtually no differences existed within the school dimension construct, including school resources and school climate. The mean score for male students measuring school resources was 24.76 (N = 167, SD = 2.54), and the mean score for female students measuring school resources was 24.88 (N = 167, SD = 1.96). Furthermore, the mean score for school climate with the school dimension showed little differences. The mean score for male students measuring school climate was 23.55 (N = 167, SD = 2.21), and the mean score for female students measuring school resources was 23.41 (N = 167, SD = 2.32).

Alternatively, male students' mean score for grade repetition was roughly 12% higher than that for female students. A lower mean score for grade repetition indicated a smaller percentage of students that were retained as measured by the grade repetition survey question in Appendix A. The mean score for grade repetition for male students was .60 (N = 167, SD = .74), and the mean score for grade repetition for female students was .68 (N = 167, SD = .81). Female students repeated grades more frequently than male students in this school.

Table 18

Descriptive Statistics on School Dimension Variables by Gender

Descriptive Statistics for Male Students (N = 167)

	Minimum	Maximum	Mean	Std. Deviation
Grade Repetition	0	3	0.60	0.74
School Resources	18	33	24.76	2.54
School Climate	17	31	23.55	2.21

Descriptive Statistics for Female Students (N = 167)

	Minimum	Maximum	Mean	Std. Deviation
Grade Repetition	0	3	0.68	0.81
School Resources	19	29	24.88	1.96
School Climate	17	31	23.41	2.32

School Dimension: Descriptive Statistics by Ethnicity

The results in Table 19 indicate differences between the Batwa and Rwandan participants within the study. Batwa students' mean score for grade repetition was roughly 17% lower than that of Rwandan students. The independent variable grade repetition reported a mean score for Batwa students of .79 (N = 106, SD = .84) and for Rwandan students of .57 (N = 228, SD = .73). The results indicated that Batwa students were 32% more likely to repeat a grade.

The remaining independent variables school resources and school climate reported additional differences based on ethnicity. The analysis reported that the mean score for Batwa students measured against school resources was 24.44 (N = 106, SD = 25.64), while the mean score for Rwanda students measured against school resources was 25.00 (N = 228, SD = 20.94).

Furthermore, the mean score for Batwa students measuring school climate was 23.72 (N = 106, SD = 2.46), while the mean score for Rwandan students measuring school climate was 23.37 (N = 228, SD = 2.16).

Table 19

Descriptive Statistics on School Dimension Variables by Ethnicity

Descriptive Statistics for Batwa Students (N = 106)

	Minimum	Maximum	Mean	Std. Deviation
Grade Repetition	0	3	0.79	0.84
School Resources	18	33	24.44	2.56
School Climate	19	31	23.72	2.46

Descriptive Statistics for Rwandan Students (N = 228)

	Minimum	Maximum	Mean	Std. Deviation
Grade Repetition	0	3	0.57	0.73
School Resources	19	30	25.00	2.09
School Climate	17	31	23.37	2.16

School Dimension: Correlation Statistics by Gender

A correlational matrix was devised for student cumulative test scores, grade repetition, school resources, and school climate based on the gender of participants in the study. Male student test scores as displayed in Table 20 were not significantly correlated with school resources (r = .13). Alternatively, male student test scores were significantly correlated negatively with grade repetition (r = -.27) and school climate (r = -.16). Female test scores were significantly correlated

positively with school resources (r = .19). However, female student test scores were significantly

correlated negatively with grade repetition (r = -.41). School climate did not significantly correlate

with female student test scores (r = -.11).

Table 20

Correlations on School Dimension Variables by Gender

Correlation for Male Students (N = 167)

	School Resources	School Climate	Student Test Scores
Grade Repetition	.05	.12	-.27[**]
School Resources	-	.03	.13
School Climate		-	-.16[*]

*p < 0.05, **p < 0.01

Correlation for Female Students (N = 167)

	School Resources	School Climate	Student Test Scores
Grade Repetition	-.03	.14	-.41[**]
School Resources	-	0	.19[*]
School Climate		-	-.11

*p < 0.05, **p < 0.01

School Dimension: Correlation Statistics by Ethnicity

The correlation matrix presented in Table 21 shows the calculated correlations by ethnicity.

Batwa student test scores were significantly correlated positively with school resources (r = .23).

Batwa student test scores were significantly correlated negatively with grade repetition (r = -.23)

and school climate did not significantly correlate with Batwa student test scores (r = -.12). In

contrast, Rwandan student test scores were significantly correlated negatively with grade repetition

(r = -.36). Rwandan student test scores were not significantly correlated with school resources (r

= .07) and school climate (r = -.13). For the Batwa and the Rwandans, the highest correlate with

test scores was grade repetition.

Table 21

Correlations on School Dimension Variables by Ethnicity

Correlation for Batwa Students (N = 106)

Dependent Variables	School Resources	School Climate	Student Test Scores
Grade Repetition	.03	.05	-.23[*]
School Resources	-	0	.23[*]
School Climate		-	-.12

*p < 0.05, **p < 0.01

Correlation for Rwandan Students (N = 228)

Dependent Variables	School Resources	School Climate	Student Test Scores
Grade Repetition	.03	.16[*]	-.36[**]
School Resources	-	.04	.07
School Climate		-	-.13

*p < 0.05, **p < 0.01

School Dimension: Multiple Regression by Gender

Several independent variables were explored to predict their impact on student

performance. Table 22 shows that the independent variable school climate was not a significant

predictor of higher male student test scores. Conversely, for male students, grade repetition (β = -

.26, t = -3.43, p < .05) and school resources (β = .15, t = 2.03, p < .05) did significantly predict student test scores. For female students, a similar pattern existed, with the same independent variables, grade repetition (β = -.40, t = -5.65, p < .05) and school resources (β = .18, t = 2.50, p < .05) significantly impacting student test scores. The remaining independent variable school climate did not significantly predict female student test scores.

Table 22

Regression on School Dimension Variables by Gender

Regression Coefficients for Male Students (N = 167)			
Dependent Variables	Beta	t	Sig.
Grade Repetition	-0.26	-3.43	0.00
School Resources	0.15	2.03	0.04
School Climate	-0.14	-1.82	0.07

Regression Coefficients for Female Students (N = 167)			
Dependent Variables	Beta	t	Sig.
Grade Repetition	-0.40	-5.65	0.00
School Resources	0.18	2.50	0.01
School Climate	-0.06	-0.84	0.41

School Dimension: Multiple Regression by Ethnicity

Table 23 reports regression analysis by ethnicity between Batwa and Rwandan populations. There were several independent variables that predicted student performance for this study. The independent variables school climate did not significantly predict test scores for either Batwa or

Rwandan students. For Batwa students, the independent variables grade repetition (β = -.23, t = -2.52, p < .05) and school resources (β = .24, t = 2.54, p < .05) did significantly predict test scores. However, school resources did not significantly predict Rwandan student test scores (β = .08, t = 1.34, p < .05).

Table 23

Regression on School Dimension Variables by Ethnicity

Regression Coefficients for Batwa Students (N = 106)

Dependent Variables	Beta	t	Sig.
Grade Repetition	-0.23	-2.52	0.01
School Resources	0.24	2.54	0.01
School Climate	-0.11	-1.15	0.25

Regression Coefficients for Rwandan Students (N = 228)

Dependent Variables	Beta	t	Sig.
Grade Repetition	-0.35	-5.61	0.00
School Resources	0.08	1.34	0.18
School Climate	-0.07	-1.15	0.25

CHAPTER 5

DISCUSSION

This chapter begins with a synopsis of the study investigating educational multi-correlates and their impact on student achievement measured by test scores with Rwandan school-aged children. This section is followed by a summary of the findings and implications. Finally, recommendations are made for further study of educational multi-correlates as they relate to predicting the impact on student academic achievement.

Synopsis of Study

Three hundred and thirty four children from one private primary school located in Rwanda participated in a survey study to examine the effects of educational multi-correlates on students' academic achievement. The survey instrument was developed based on the literature on factors that impacted achievement. The survey was divided into three prominent constructs: child dimensions, home dimensions, and school dimensions. Each section of the survey contained several survey questions that targeted specific construct items, including chores, hunger, health, parental education, parental involvement, socioeconomic status, grade repetition, school resources, and school climate. In addition, school records were consulted to acquire student test scores. A series of statistical analysis tools that included descriptive statistics, Pearson correlations, and multiple regression analysis was employed to answer the research questions presented below.

1. To what extent do specific child dimensions of chores, health, and hunger impact academic achievement within a Rwandan primary school context?

2. To what extent do specific home dimensions of socioeconomic status, parental education, and parental involvement impact academic achievement within a Rwandan primary school context?

3. To what extent do specific school dimensions of school resources, grade repetition, and school climate impact academic achievement within a Rwandan primary school context?

A non-teaching staff member of the primary school administered the survey instrument and collected the participant responses. The researcher collected and performed the analysis of the responses. The analysis tools were selected because they allowed the researcher to directly answer the research questions. The descriptive statistics were used to give an impression of the populations. Pearson's correlations were used to address the nature of the relationships between educational multi-correlates and student achievement. Regression analysis was used to determine how the predictor variables independently influenced students' academic achievement.

Summary of the Findings

The findings were summarized based on the three main constructs for the study. The child dimensions, home dimensions, and school dimensions were used to recapitulate the results as reflected in the literature on factors that influence academic achievement in East Africa and broader low-income countries. The summary of the findings will also mention the method of analysis and research questions as they relate to the review of the study outcomes. Lastly, the findings report the level of impact by gender and ethnicity.

Findings Related to the Child Dimension

The child dimension construct for this study was a compilation of several variables that have been proven to impact students' academic achievement, including chores, hunger, and health educational inputs. The results are reviewed and delineated by gender and ethnicity.

Correlation findings by gender.

- Chores reported a negative significant correlation with academic achievement for female students.

- Hunger reported a negative significant correlation with student academic achievement for male and female students.

- Good health reported a positive significant correlation with student academic achievement for male and female students.

Regression analysis findings by gender.

- Chores predicted academic achievement for male and female students within the study.

- Hunger predicted academic achievement for male students within the study.

- Health predicted academic achievement for male and female students within the study.

Reporting the analysis by gender was important in understanding differences in educational attainment for both male and female students at the primary school level. The findings showed that chores significantly correlated negatively with student achievement for female students. The findings also showed that chores was a greater predictor for female students than for male students. Several authors pointed to differences in the way gender impacted the delegation of chores. Girls have been shown to be impacted differently than boys when it comes to performing chores (Mungai, 1998; Mungai 2012). Other authors attributed the differences between gender to cultural practices (Hungi & Thuku, 2010b; Colclough et al., 2000). These authors agreed that cultural practices involving girls performing home responsibilities of caring for siblings, cooking, and cleaning impacted girls' education. Furthermore, girls were expected to marry at an early age, forcing them to withdraw from school, the authors noted. Alternatively, boys have been reported to have higher opportunity cost as opposed to girls (Glick & Sahn, 2000), meaning that boys have

more options to work to afford school supplies and school fees. But as Patrinos and Psacharopoulos (1995) conjectured, the opportunity for boys to work directly impeded their ability to perform well in school.

The findings supported the literature postulating that specific child dimensions of health and hunger did influence student's grades (Hungi and Thuku, 2010a; Glewwe et al., 2001). In terms of health, children that suffered from bad health performed worse in school. Zhao and Glewwe (2009) concluded that a child's health measured by weight and height impacts his or her achievement in school, meaning that children with lower weight and height as compared to peers did not perform as well in school. These findings were also corroborated by a study conducted in Nigeria. Abidoye (2000) found that nutritional status (using weight and age) significantly impacted later school performance. According to the headmaster of the school in Rwanda, intestinal complications, vision impairment, and bouts of malaria have caused students to miss school due to poor health.

Although health and hunger were treated as separate variables, the interconnectedness or associations between them were tightly coupled. For example, Woldehanna et al. (2005) found that malnutrition negatively impacted achievement and that lack of food influenced the overall health of children. Likewise, additional authors (Hungi & Thuku, 2010a; Hungi & Thuku, 2010b; Smith & Barrett, 2011) using the Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) data set examining 14 sub-Saharan African countries found that children who ate more performed better in school. Access to better health and nutrition was directly tied to the availability of resources to purchase food. The lack of these resources impeded a child's ability to perform in school as compared to peers who possessed more human and social capital.

Correlation findings by ethnicity.

- Chores reported a negative significant correlation with student academic achievement for Rwandan students.

- Hunger reported a negative significant correlation with student academic achievement for Batwa and Rwandan students.

- Health reported a positive significant correlation with student academic achievement for Batwa and Rwandan students.

Regression analysis findings by ethnicity.

- Chores predicted academic achievement for Batwa and Rwandan students.

- Hunger predicted academic achievement for Batwa students.

- Health predicted academic achievement for Batwa and Rwandan students.

As highlighted above, chores negatively impacted student achievement for Rwandan students. The negative impact of household duties has been supported in the literature to affect students' academic achievement. Surprisingly, chores did not significantly correlate with Batwa students' academic achievement. But, chores did significantly impact Batwa student test scores based on the regression results. The regression results, however, showed that chores predicted academic achievement for both Batwa and Rwandan students. The regression coefficients showed a stronger prediction of Batwa in students' achievement levels.

There were differences for the educational input of hunger in terms of ethnicity. The input variable hunger reported to correlate with students' academic achievement for both Batwa and Rwandan students. The relative strength of the correlational differences between Batwa and Rwandan students was small. The independent variable hunger also reported to predict Batwa student test scores. The hunger variable did report a significant direct effect for the Batwa student

population only, meaning the availability of food for Batwa students directly influenced the ability to score higher on tests provided by the primary school.

Student health showed a significant positive impact on academic achievement for Batwa and Rwandan students. These findings were also supported in the literature on educational inputs that influenced student achievement. Although the results showed small differences between the relational and predictive associations concerning Batwa and Rwandan students, the mean student test scores were 19% higher for Rwandan versus Batwa students. Rwandan students performed better in school across the summated test scores. There was no literature available that looked at the academic differences of ethnicity within a Rwandan context.

Findings Related to the Home Dimension

The home dimension construct for this study was a compilation of several variables that have been proven to impact students' academic achievement, including parental education, parental involvement, and socio-economic status educational inputs. The results are reviewed and delineated by gender and ethnicity.

Correlation findings by gender.

- Parent involvement reported a negative significant correlation with student academic achievement for female students.

- SES reported a positive significant correlation with student academic achievement for male and female students.

Regression analysis findings by gender.

- Parental involvement predicted academic achievement for female students.

- SES predicted academic achievement for both male and female students.

The results from this study revealed the nature of the relationships between parental involvement and academic achievement. Across both statistical methods to include Pearson's correlation and multiple regression, parent involvement held negative relational and predictive qualities as it related to achievement within the study population. Furthermore, the results emphasized a significant direct relationship between parental involvement and students' academic achievement. The evidence as presented in the literature is contrary to the research findings. Based on a preponderance of other studies examining school factors and achievement, parental involvement has been shown to positively impact student performance in school (Bojuwoye & Narain, 2008; Howie et al., 2009; Sedibe, 2012; van Staden & Bosker, 2014).

Few researchers have corroborated the findings that parental involvement negatively impacted academic achievement. In Smith and Barrett's (2011) analysis of the 14 sub-Saharan SACMEQ data set, the authors suggested that parental involvement had minimal negative effects. They concluded that "for every one point increase of home support for school work, a pupil on average attained one point less on the reading test compared to pupil whose parents provided no support" (p. 14). In a meta-analysis examination of 20 studies that looked at parental involvement and achievement, the authors (Patall et al., 2008) surmised that a negative association was evident for middle school students and that parental involvement had a negative association on mathematics achievement. More specifically, the authors concluded that parent monitoring of homework, especially when monitoring in isolation without clear guidelines or reinforcement, was looked at as more controlling than informative, which resulted in lower performance. Lastly, the authors suggested that the lack of subject matter knowledge may have been a cause of the negative association with parental involvement and achievement in mathematics. It must be noted that the

assertions presented from the meta-analysis did not include low-income countries. No distinctions were presented based on gender in the studies mentioned above.

The findings from this study aligned well with the research in low-income countries examining educational inputs and their effects on academic achievement. The socioeconomic status of students and families has been shown to influence student educational attainment (Colclough et al., 2002; Fuller, 1987; Hungi & Thuku 2010a). More specifically, Hungi and Thuku (2010a) concluded that students who could afford learning materials such as books, pencils, pens, and notebook paper scored higher in math and reading scores for Kenyan boys and girls. The human and social capital resources available to parents and their children directly impacted children's ability to perform well in school. Across all three statistical methods, SES was shown to affect students' academic achievement.

Likewise, socioeconomic status has also been known to play an important part in determining school completion (Appleton, 1991; Hanushek & Lavy, 1994). School completion was defined by the Rwandan Ministry of Education (MINEDUC, 2003a) as the number of pupils who were new entrants in the last year of primary school in a given year, expressed as a percentage of the total number of population having official age for being in the last year of primary school. In another Kenyan study, Lloyd et al. (2000) concluded that children who scored higher on the wealth index had higher school completion rates than children who scored lower on the wealth index. The consensus of these authors underscored the importance of how socioeconomic status directly impacted a child's ability to complete school.

Correlation findings by ethnicity.

- Parental involvement reported a negative significant correlation with student academic achievement for Rwandan students.

- SES reported a positive significant correlation with student academic achievement for Batwa and Rwandan students.

Regression analysis findings by ethnicity.

- Parental involvement predicted academic achievement for Rwandan students.

- SES predicted academic achievement for both Batwa and Rwandan students.

Surprisingly, the results for the input variable parental education neither correlated nor predicted student achievement for either Batwa or Rwandan students. However, parental involvement showed a weak negative correlation with students' academic achievement based on ethnicity for Rwandan students. These findings are contrary to the literature examining home factors that impacted achievement (Admasu, 2004; Galeb et al., 2005; Smits & Hoşgör, 2006). As mentioned earlier, several authors have concluded that a negative association exists between parental involvement and student academic performance in school (Patall et al., 2008; Smith and Barrett, 2011), but no studies exist that explain the nature of the negative associations based on ethnicity.

The last factor within the home dimension that measured the level of impact based on student achievement was socioeconomic status. The findings reported that socioeconomic status had a significantly positive correlation with students' academic achievement for both Batwa and Rwandan students. The regression statistical methods revealed that SES predicted student performance for only the Rwandan student population. SES is widely accepted in the literature to positively impact achievement (Colclough et al., 2002; Lee et al., 2011; Woldehanna et al., 2005). Moreover, researchers reported that mathematics and reading scores were positively impacted in African boys and girls in Kenya (Hungi and Thuku, 2010a). No research has been performed

examining the linkages between a small micro-tribe such as the Batwa and the predominant Rwandan population and the impacts of SES on student achievement.

Findings Related to the School Dimension

The school dimension construct for this study was a compilation of several variables that have been proven to impact students' academic achievement, including grade repetition, school climate, and school resource educational inputs. The results are reviewed and delineated by gender and ethnicity.

Correlation findings by gender.

- Grade repetition reported a negative significant correlation with student academic achievement for male and female students.

- School resources reported a positive significant correlation with student academic achievement for female students.

- School climate reported a negative significant correlation with student academic achievement for male students.

Regression analysis findings by gender.

- Grade repetition predicted academic achievement for both male and female students.

- School resources predicted academic achievement for both male and female students.

The findings from this study were supported within the literature. Across all the statistical methods analyzing the data set, grade repetition showed a significant negative correlation for both male and female students. In addition, the regression analysis results showed that grade repetition predicted student achievement for both male and female students in the study. There have been many studies looking at the effects of grade repetition. The consensus in the literature in low-income countries, and more specifically African nations, concluded that grade repetition played a

significant negative part on the academic advancement of students (Lee et al., 2005; Smith & Barrett, 2011). In the examination of 14 sub-Saharan countries, authors Hungi and Thuku (2010b) concluded that "across SACMEQ school systems, grade repetition was found to be an important factor in pupil reading achievement with pupils who had never repeated a grade estimated to achieve better in reading than pupils who had repeated a grade one or more times" (p. 91). These findings were supported by the same authors in another study conducted in Kenya (Hungi and Thuku, 2010b). The authors determined that pupils who had never repeated a grade were estimated to achieve better results in mathematics and reading than pupils who had repeated a grade one or more times.

What is important about the unanimity in the literature as supported within this study was the rationale or explanations of why grade repetition had a negative impact. Brophy (2006) suggested that teachers are untrained in how to make decisions about which students are identified as a repeater. Furthermore, studies done in rural Brazil (Gomes-Neto & Hanushek, 1994) and in rural Pakistan (King et al., 1999) found that promotion decisions were closely related to measured achievement. In developing countries, teachers did not have access to national performance indicators and thus based promotion on relative performance compared to peers. Ikeda (2002) concluded that the retention disparity between student proficiency in high- and low-achieving schools was based on a lack of national standards and norms. Lastly, Brophy (2006) postulated that stress caused from grade repetition expressed itself in other areas to include low self-esteem, impaired relationships, alienation from school, and an increase in school dropout rates.

School resources as a component contained in the school dimension reported a positive correlation, a predictive quality, and a direct effect on academic achievement for female students. Likewise, male students, when analyzed across all three statistical methods, were significantly

impacted by school resources measured against student test scores. The findings of this study have been reinforced by several researchers examining school resources in low-income countries (Mukudi, 2003; Kemi, 1990). For example, school and classroom materials have been linked to positively impact achievement (Hungi and Thuku, 2010a). This was further supported in several Kenyan studies examining the effects of availability of textbooks, lab chemicals, and equipment (Mudulia, 2012) and classroom supplies, libraries, and water supply (Onderi & Croll, 2008).

Researchers point to two reasons why gender is impacted by achievement and school resources. The literature highlighted the direct cost and opportunity cost for schooling as the primary reasons for gender disparity and its impact on student achievement. According to Brown and Park (2002), the direct cost of schooling included school fees, school supplies, materials, and uniforms. Glick and Sahn (2000) posited that boys had greater availability to earn money for school fees and had lower direct costs for schooling in contrast to girls. The second reason the availability of school resources impacts achievement by gender is the opportunity cost. According to Colclough et al. (2000), the opportunity cost contained components of work responsibilities of children at home to include fetching water, caring for siblings, and gender-specific cultural practices (e.g., girls getting married at young ages and boys going to work). For example, girls are thought to have a higher opportunity cost than boys due to cultural differences that include sibling care and household chores (Kibugi et al., 2013).

Finally, the educational input variable within the school dimension that underscored the impact on student achievement was school climate. The examination of school climate for this study reported a significant negative relationship with academic achievement for male students. No correlations were found for school climate and achievement with male and female students. The literature is limited in terms of the identification of school climate and what constitutes good

school climate versus bad school climate. The body of work regarding school climate did not discuss gender disparity when assessing levels of impact on achievement.

Correlation findings by ethnicity.

- Grade repetition reported a negative significant correlation with academic achievement for Batwa and Rwandan students.

- School resources reported a positive significant correlation with academic achievement for Batwa students.

Regression analysis findings by ethnicity.

- Grade repetition predicted academic achievement for both Batwa and Rwandan students.

- School resources predicted academic achievement for Batwa students.

The findings revealed that grade repetition had a significant correlation with academic achievement for both Batwa and Rwandan students. In addition, the input variable grade repetition also predicted student achievement for both Batwa and Rwandan students. Unfortunately, there has been no research in Rwanda looking at ethnicity and achievement with respect to grade repetition to help explain the phenomenon. There has been research that examined grade repetition and its effects on achievement within low-income countries as mentioned earlier, but no research has been conducted examining the array of school dimension variables as they relate to ethnicity in Rwanda.

The findings based on the analysis of the educational input variable school resources showed that school resources had a positive significant correlation with academic achievement for Batwa students. Furthermore, the analysis showed that the educational input variable school resources reported to predict student achievement for Batwa students. Regrettably, no research has been conducted looking at school resources based on ethnicity in a Rwandan context.

Implications

The findings from the study have far-reaching associations for those who care about the advancement of children, but more specifically, Rwandan primary school-aged children. This study has implications for school administrators and teachers, parents, and government officials that influence and direct education policy. These three non-mutually exclusive groups serve to provide the social and human capital to directly influence children, and thus the future of Rwandan society. The educational inputs or factors operationalized as educational multi-correlates examined within this study have been shown to directly affect students' academic achievement.

A model for student improvement in Rwanda is presented below. It includes the overarching phenomenon of education as the central theme in directing change and ascribes education as the primary instrument to increase student performance.
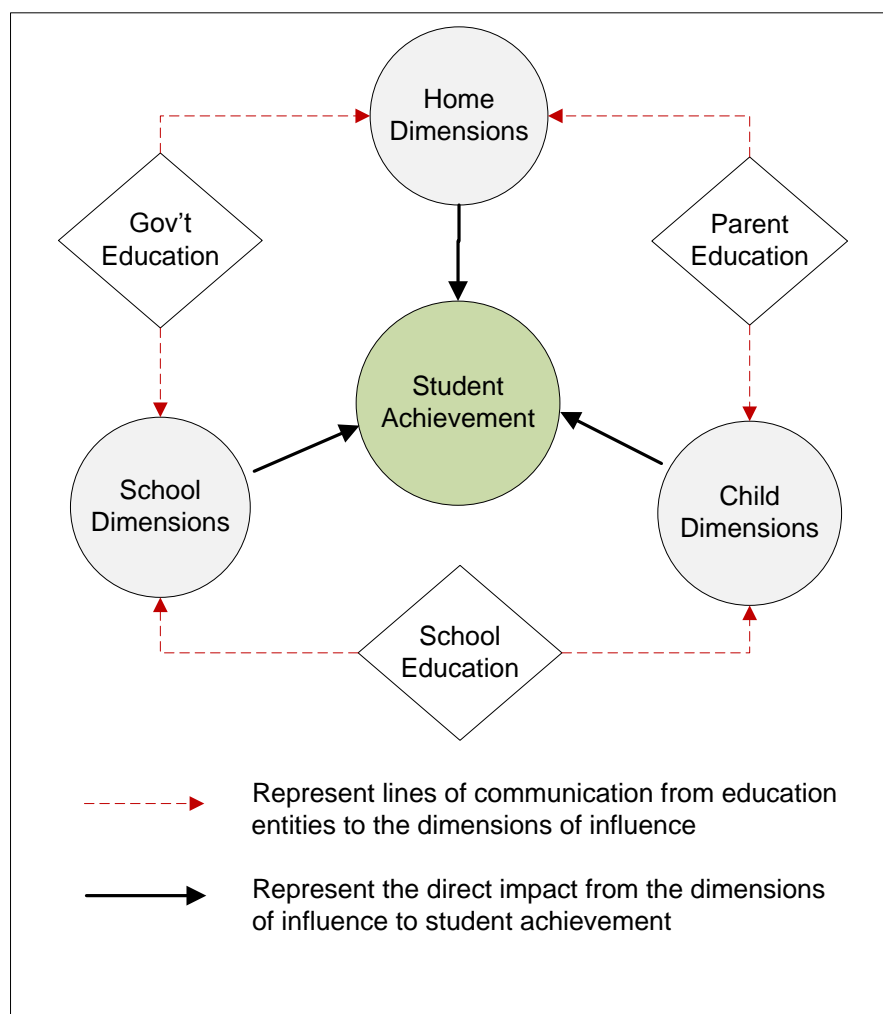
Figure 5. Student Success Improvement Model

Government education. Broadly speaking, education at the government level is essential to helping children achieve in school. GoR and the Ministry of Education in particular must become more educated and synthesize best practices to inform low-cost policy initiatives. This can be accomplished by directing the National Institute of Statistics in Rwanda to conduct research that examines the impediments and beneficial components to education in both urban and rural environments. In addition, GoR can participate in educational conferences and partner with educational NGOs and universities to conduct research on student achievement factors and policy.

Based on the findings, GoR has several areas in which policy can help children progress in school. In terms of addressing gender disparity, GoR has developed the Education Sector Strategic Plan (ESSP) and has adopted the Millennium Development Goals (MDGs) to decrease gender inequity. As noted earlier, for gender differences in terms of access to primary education, Rwanda meets the MDGs. In addition, the mean test scores differences between male and female students are equal, meaning the results showed that no differences in gender disparity in terms of school access. Based on the findings, the work responsibilities and the levels of parental involvement based on gender highlight some areas of concern. The analysis of the effects of both parental involvement and chores showed a negative direct effect on achievement. Moreover, females were negatively impacted by these variables in contrast to males.

Several authors posited that cultural differences predominantly influenced the work responsibilities of children and the expectations of parents as they interacted with their children in helping them in school. GoR can play a role in combating the negative aspects of chores and parental involvement. The literature did, however, point to positive components of these same aspects. For example, GoR can positively aid its educational improvement efforts by addressing the information dissemination efforts primarily at the district level. There are currently five districts in Rwanda. Each district contains numerous sectors, and each sector contains numerous cells (e.g., the primary school in this study is located in Kamonyi District, Rundi Sector, and Kagina Cell). Communication is propagated from the central government all the way down to the cell level through regular meetings. These meetings provide the local leaders and constituents with information to move the country forward. The researcher for this study has personally participated in several of these meetings at the cell and sector levels with an interpreter. GoR can use this communication vehicle as a means to inform the broader populace about ways in which

to improve education, specifically, suggesting better ways to help female students at home with school work and with home responsibilities.

As a matter of educational policy within the ESSP and Vision 2020 frameworks, provisions can be implemented to insure that parents are aware of strategies to help female students at home with homework. Although in many rural areas parents do not have the subject matter knowledge to help with school lessons, alternative strategies can be suggested and implemented, including encouraging students to complete school lessons at home, monitoring school activities, and engaging with school personnel to monitor children's progress. The cell-level meetings provide a forum in which parents can readily receive information regardless of the educational background of the listeners. Policy can be used as a vehicle to inform communities on best educational practices.

Likewise, the same medium can be used to educate leaders at the district, sector, and cell levels and in communities about potentially negative cultural nuances that impact girls' ability to complete school. For example, female students often engage in taking care of siblings, marry at early ages, and cook and clean. The inclusion of women into the workforce is a powerful tenet within Vision 2020 aimed at transforming the agricultural economy into an information-based economy of self-sustainability. Policies can be shaped to further encourage female education coupled with strategies such as changing the expectations for marriage as they relate to age and suggesting time for homework and home duties (i.e., child labor laws).

Policy initiatives can also be used to address some of the concerns as they relate to ethnicity and achievement. One potential caveat in targeting the Batwa school-aged children is the relative small population and the cost associated in reaching the micro-tribe versus the general population. The findings revealed that health, hunger, and chores impact Batwa school-aged children within

the study. As mentioned earlier, the Batwa micro-tribe has very limited land and resources to sustain a good quality of life as compared to the remaining 99% of the nation. The availability of producing adequate portions of food to provide nourishment for healthy growth is a real challenge. This is perhaps exacerbated in their children's responsibilities to help earn money from making pottery.

In contrast, for Rwandan students within this study, the findings revealed broader challenges to include health, parental involvement, SES, grade repetition, and chores. The specific educational multi-correlates such as health and grade repetition are of particular concern because MINEDUC can address them within the framework of the ESSP. As noted in the literature, grade repetition and the criteria to hold children back are not systematic, meaning each respective district or school has its own internal rules for grade repeaters. Policy can be drafted to institute a systemic approach to measuring low-performing students and providing guidelines that school personnel can implement for low-performing students.

Student health and SES, on the other hand, are broader issues outside of the MINEDUC governing capacity. These particular factors can be addressed at the national level by GoR, using the same medium to communicate all the way to the cell level. Policy makers can educate communities about food choices. In rural areas, low-calorie and low-protein foods such as maize and potatoes are a staple of the daily diet. This is in part due to water availability and speed of crop yield.   Education provided at the cell-based meetings can inform communities on supplemental items to add to the diet to increase the overall health of children. In addition, GoR can provide mosquito nets to combat malaria. According to the World Malaria Report, there were 962,000 confirmed cases of malaria in Rwanda reported in 2013. Malaria has been reported to impact a student's ability to attend school, which is associated with school performance.

According to Vision 2020, education is seen as a key component to increasing the overall socioeconomic status of the Rwandan citizenry. Although MINEDUC has implemented policies to educate all children until ninth grade, the matriculation into secondary school is difficult. As noted before, only 20% of the primary school-aged population have the opportunity to attend secondary school and the chance to attend tertiary school is even smaller. Secondary school is not free and costs a great deal for the average citizen. Trade schools are a means to alleviate the problem, and GoR has made a concerted effort to change, but the sheer financial resources do not allow more students to attend secondary school. Although the mantra from GoR is self-sustainability, seeking outside funding is crucial to ensuring that more children have access to secondary education. Policy makers must consider avenues in which to increase access to secondary school.

School education. School administrators and teachers are the gateway to learning and, more specifically, the linchpin to academic achievement for children. School administrators and teachers should engage in activities that increase their subject matter expertise and examine internal means of continual improvements. Researchers have found that participation in pre-service and in-service teacher training, professional development activities, and mastery of subject matter (Hardman, 2012; Otienoh, 2010; Pelini, 2009) influenced student achievement. In rural areas, like the one selected for this study, teacher training options are rare. But there are ways in which teachers can receive training. Using methods of action research and team teaching and coaching (Zepeda, 2012) can provide a wealth of transferable knowledge between school staff, in addition to maintaining a standardized teacher appraisal plan (Odhiambo, 2005; Wanzare, 2012).

Currently there is a national curriculum and schools are tied to specific benchmarks as outlined by MINEDUC. In addition, national exams determine which students are allowed to

matriculate into secondary school. Based on the findings, school personnel can emphasize strategies to improve students' academic achievement for the grade repetition and parental involvement multi-correlates. Areas of concern within the study include the impact of school resources and parental involvement. School leaders must create environments where parents feel free to interact with school teachers and leaders. The level of engagement of the principal, measured by supervision of teachers and good interpersonal interactions with parents, will also positively influence students' achievement (Kodzi et al., 2014).

The findings revealed a weak correlation between school resources for female students and Batwa students. This implies that for female and Batwa students, they did not feel adequately prepared at school in terms of having school supplies. At the beginning of each school year, parents are asked to provide basic school supplies to include, but not limited to, toilet paper, pencils, and notebooks. According to the school headmaster, many children and parents have trouble giving their portion of supplies from home. The school provides additional supplies to include crayons, makers, paper, rulers, and books. Based on the findings, female and Batwa students reported that they didn't have enough learning materials. Although specific school learning materials provided by the school are distributed equally within the school, some students feel left out. School leaders and teachers must be aware of the perceptions and consider possible improvements to mitigate those views. Additionally, to identify more areas of concern within the school, schools can provide needs assessments and school climate surveys. Likewise, the utilization of staff evaluations from students to gauge perceptions, attitudes, and beliefs of the children being served can be helpful for school leaders.

While aspects of parental involvement and its impact on academic achievement have a lot to do with parents, school leaders and teachers can positively influence the level of engagement

parents have with their children. "Efforts to involve parents should be grounded in the knowledge that parents' beliefs about their roles in children's schooling and their effectiveness in helping their children succeed are the primary points of entry into increased, and increasingly effective, involvement" (Hoover-Dempsey & Sandler, 1996, p. 35). There are ways in which school personnel can help parents interact with children. School teachers can encourage and organize school outreach to parents programs. As stated in the literature, parents often feel intimidated by the operational structures of school (Okeke, 2014). School leaders and teachers can develop programs to encourage parents to visit classrooms, speak with teachers and school headmasters, and make inquiries about the progress of their children. Furthermore, school teachers can conduct regular open houses and organize parent conferences to explain how parents can best help students. In the conferences, teachers can provide parent strategies, including monitoring homework and providing a place and time to perform school work.

Parent education. Parent education is essential in helping children achieve academically. The majority of primary schools in Rwanda are located in rural areas. The educational attainment of parents in rural areas is low. In this study, based on a rural population in Rwanda, most of the parents have not completed primary school. As reported by the participants within the study, 77% of fathers received some primary level of education as compared to 80% of mothers. This may impact the ability of parents to help their children with school work. Furthermore, the most families within the study as reported by the participants for both mother and father occupation were either peasants or farmers, meaning, most parents represented by their children in the study did not complete primary school nor possess the means to earn wages in areas beyond farming and making pottery. The need for parents to become more educated is essential

in moving families forward, both in terms of helping children matriculate through school and utilizing information to make better decisions at home.

Based on the findings within this study, the implications can determine how educating parents can be accomplished in a number of ways. As mentioned earlier, schools can serve as a means to educate parents on a series of components that directly impact the levels of student achievement and engagement. For example, within the constraint of the financial resources available to parents, the school can inform parents about the importance of providing basic school supplies by helping parents understand the associations between grades and learning materials. In addition, parents can engage more with schools to better understand ways in which they can help their children and the school. One drawback to this example is parents not having adequate social capital to provide the needed school supplies for their children. Despite apprehensions of parents interacting with schools as noted in the literature (Patall et al., 2008), parents can help schools create learning environments. By becoming more involved in school activities and learning ways in which to help students with school work at home, parents can directly impact the learning environment both at school and at home.

One avenue readily available to parents to become educated about their children's matriculation through school is the access, coordination, and dissemination of information through the local Parent Teacher Association (PTA). According to MINEDUC (2011), 62% of primary schools are owned by parent associations. The researcher for this study has participated in several PTA meetings throughout East Africa. As observed, parents are concerned about how their children are treated and seek ways to help them succeed. The local PTA meetings can disseminate information to parents to help them make better decisions about child rearing practices, discouraging those cultural differences between girls and boys that negatively impact achievement,

and presenting strategies to acquire resources for school supplies. For example, in the PTA meetings observed, parents were discussing the payment of school fees and expressing their views of excluding the Batwa from participation in the requirement. They also discussed collecting and pooling money for the micro-tribe to help them afford equipment repairs. The local PTA is a powerful tool to encourage and inform parents about how specific factors can help parents and their children at school and home.

Parents can also become more educated based on the content provided from the local district, sector, and cell meetings held regularly. Some level of coordination should take place between the local leaders and communities about the topics discussed in meetings to include subjects that relate to schooling and children. As observed, these meetings are essential avenues in which community members including parents have access to information circulated by the central government. Specifically, as shown in the findings, matters of health and hunger are of principal concern. These meetings can be used to educate parents and community members in simple strategies to increase the health levels of families. For instance, nutritional and dietary supplementary information linked to directly impact the weight and height of students can be addressed. As supported in the literature, modifications in diet can increase the average weight and height of children and thus impact achievement (Zhao & Glewwe, 2009). Moreover, the importance of mosquito nets in combating malaria and the boiling of water for purification and consumption can be very helpful to families in rural areas. These additional measures will help parents make better informed decisions and potentially impact students' academic achievement.

Recommendations for Future Research

Findings from this study suggest several other interesting areas for future research. The findings of this study are limited to the population of primary school-aged children in a rural

private school located in Rwanda. One avenue for future research is to repeat the study with a national sample of government and private primary schools and to determine the persistence of the findings across geographic districts and sectors. Additionally, the instrument could be adapted for secondary school participants to determine the education factors and their impact on secondary student achievement.

As with many quantitative studies, this study revealed useful findings based on the questions included. However, a qualitative study could be used to further explore the components of the educational multi-correlates from the voices of the students, teachers, and parents. A qualitative study could more thoroughly reveal how those perspectives look at student achievement and those factors that affect performance. In addition, a qualitative study could be useful in determining the interactions between social capital, school resources, and achievement.

The analysis of the results from the educational multi-correlates survey showed negative correlations between parental involvement and gender. Since these findings were supported by limited sources from other studies, more specificity is needed in understanding what explicit attributes of parental involvement impact student achievement negatively. Additional important research can be conducted to explore the role of gender and the associated cultural differences between the sexes on the negative components of parental involvement and achievement. Likewise, the analysis of the findings showed negative associations between ethnicity and students' academic achievement. There has been no study examining the Batwa micro-tribe and the effects of parental involvement on student performance in schools. Moreover, no studies exist that contrast the negative associations between the micro-tribe and the broader population on parental involvement and achievement. More research is needed to study activities that discourage children from performing in school based on participation from parents.

This study measured school climate and determined that there were negative associations with students' academic achievement. The findings ran contrary to the literature and require further study and analysis. A study could be conducted that determined specific components of school climate, like how the role of teachers, peers, and the school environment negatively impact achievement in a Rwandan context. Moreover, how these role players influence achievement based on gender and how cultural differences in Rwanda impact school climate and achievement are other areas of interest in which more research is needed.

Lastly, the findings showed that school resources influenced academic achievement for Batwa students. More research is need to investigate what learning materials are missing and to a greater extent, which school supplies have the greatest influence over academic achievement within Rwanda and the broader populations in other low-income countries where the Batwa reside. Some of the countries throughout East Africa where there have been documented populations of the micro-tribe Batwa are Uganda, Congo, Burundi, and Tanzania. More research is needed to examine ways in which the micro-tribe is educated and what factors directly impact their well-being.

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APPENDIX A

Educational Multi-correlates Survey

BIOGRAPHICAL QUESTIONS

1. Immediate Family Size:
2. Fathers/Mother Job:
3. Birthday:
4. Grade Level:

HOUSEHOLD QUESTIONS

1. What is the highest level of education of your father?

I don't know	No Schooling	Primary	Secondary	Tertiary
☐	☐	☐	☐	☐

2. What is the highest level of education of your mother?

I don't know	No Schooling	Primary	Secondary	Tertiary
☐	☐	☐	☐	☐

3. How often does your mother help you with school lessons?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

4. How often does your father help you with school lessons?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

5. How often does your father check over your school work?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

6. How often does your mother check over your school work?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

7. How often do your parents attend school meetings?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

8. How often does your family use **electricity** at night?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

9. How often does your family sleep on a **mattress**?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

10. How often does your family use a **mobile phone**?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

11. How often does your family watch **television**?

	Never	Rarely	Sometimes	Often	Always
	☐	☐	☐	☐	☐

12. How often does your family listen to the **radio**?

	Never	Rarely	Sometimes	Often	Always
	☐	☐	☐	☐	☐

SCHOOL QUESTIONS

1. How often do you use **pencils** at school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

2. How often do you use **notebooks** at school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

3. How often do you use **school supplies** to complete assignments at school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

4. How often do you use **rulers** in school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

5. How often do you read **books** at school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

6. How often do you use **crayons** at school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

7. How often do use **flash cards** at school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

8. How often do you argue with other students at school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

9. How often does your teacher treat you fairly?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

10. How often do you get along with other students?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

11. How often do you get along with the teacher?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

12. How often does your teacher help with problems at school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

13. How often do you fight with other students?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

14. How often do you share ideas about learning with other students?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

CHILD QUESTIONS:

1. How often do you care for animals?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

2. How often do you care for your siblings?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

3. How often do you help with cooking at home?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

4. How often do you fetch water at home?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

5. How often do you help with cleaning at home?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

6. How often do you eat breakfast before school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

7. How often do you eat during lunch break at school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

8. How often do you eat dinner at home?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

9. How often do you feel hungry at school?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

10. How often do you come to school feeling sick?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

11. How often do you come to school feeling healthy?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

12. How often do you miss school because you feel sick?

Never	Rarely	Sometimes	Often	Always

☐	☐	☐	☐	☐

13. How often do you miss school because of school fees?

Never	Rarely	Sometimes	Often	Always
☐	☐	☐	☐	☐

14. How many times have you repeated a class?

Once	Twice	Three Times	More than 3
☐	☐	☐	☐

Appendix B

Parental Consent

I agree to participate and allow my child, _____, to take part in a research study titled, "Rwanda Indicators for Success," which is being conducted by **Mr. Jean De Dieu Nsabimana** from Crimson Foundation. Our participation is voluntary which means I do not have to allow my child to be in this study if I do not want to. We can refuse to participate or stop taking part at any time without giving any reason, and without penalty or loss of benefits to which she/he is otherwise entitled. I can ask to have the information that can be identified to be returned to me, removed from the research records, or destroyed.

- The reason for the study is to identify key indicators for academic success at Crimson Academy.
- The research is not expected to cause any harm or discomfort. We can quit at any time. My child's grade will not be affected if my child decides not to participate or to stop taking part.
- Any individually-identifiable information collected about us will be kept confidential unless otherwise required by law. Our identity will be coded, and all data will be kept in a secured location.
- The researcher will answer any questions about the research now, or during the course of the project, and can be reached by telephone at +250 788 967 77 07 or email at staff@crimsonacademy.com.
- I understand the study procedures described above. My questions have been answered to my satisfaction, and I agree to allow my child to take part in this study. I have been given a copy of this form to keep.

_____   _____   _____

Name of Researcher   Signature   Date

_____   _____   _____

Name of Researcher   Signature   Date

Please sign both copies, keep one and return one to the researcher.

Appendix C

Permit to Conduct Research from MINEDUC

REPUBLIC OF RWANDA

Kigali, 11.1.06.| 2013
Ref: 13.69.../12.00/2013

MINISTRY OF EDUCATION
P.O BOX 622 KIGALI

Re: Permission to carry out research in Rwanda - No: MINEDUC/S&T/0138/2013

Permission is hereby granted to Mr. HAYNES Phillip Lamont, Chairman of nonprofit organization called Crimson Foundation to carry out research on: **"Student Success Factors in Rwanda and Understanding Teacher and Parent Perspectives on Academic Achievement"**. The research will be carried out in Rundi Sector in Kamonyi District.

He will need to interview   different teachers, Students of the Crimson Academy and Parents who have the children studied in that School.

The period of research for which this permission is granted is one year **from 1st September, 2013 to 30th August, 2014**. It may be renewed if necessary, in which case a new permission will be sought by the researcher.

Please provide Mr. Mr. HAYNES Phillip Lamont any support he may require in the course of conducting this research.

Yours sincerely,

Mr. Remy TWILINGIYIMANA
Acting Director General,
Science, Technology and Research
Ministry of Education

Appendix D

Frequency Distribution & Histogram
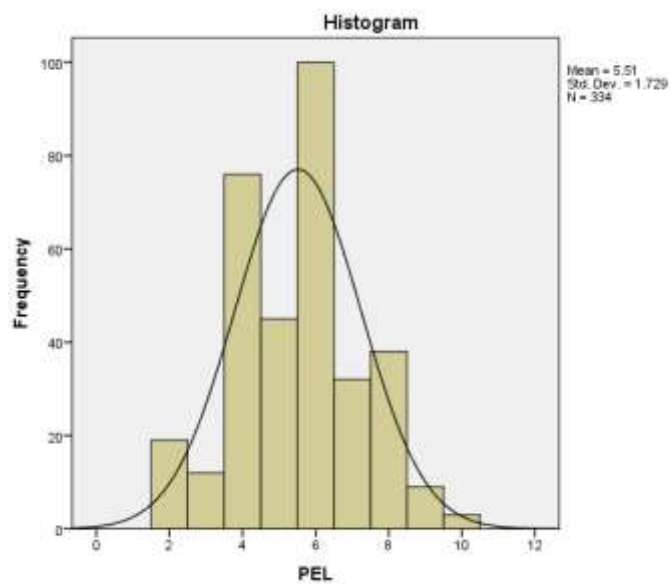
Figure 6. Parent involvement histogram
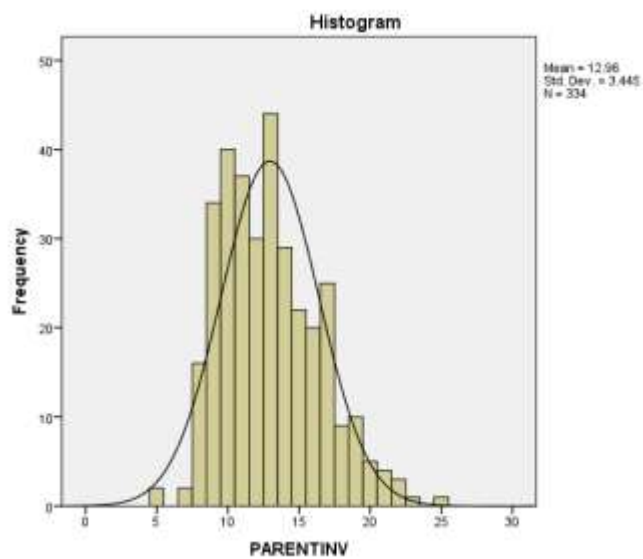
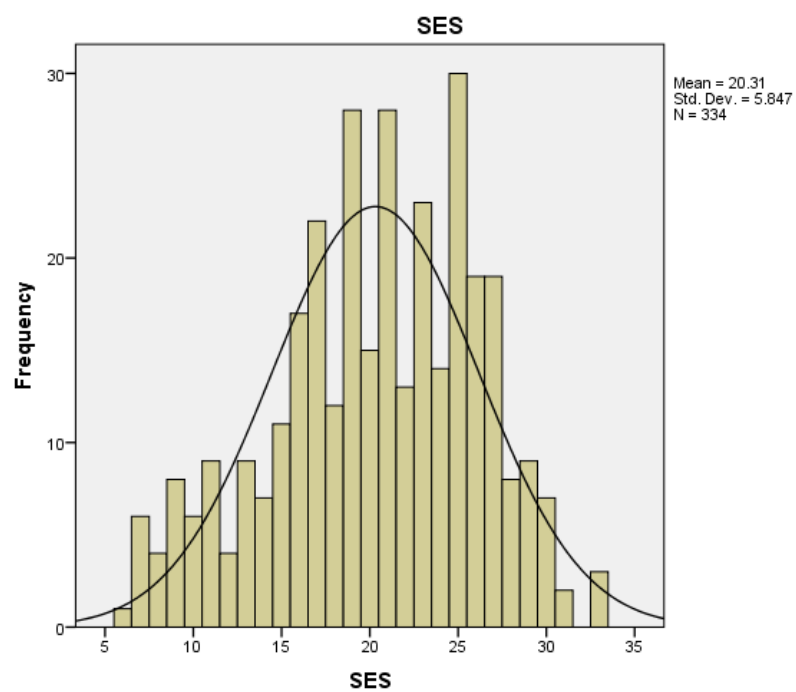*Figure 7*. Parental education histogram

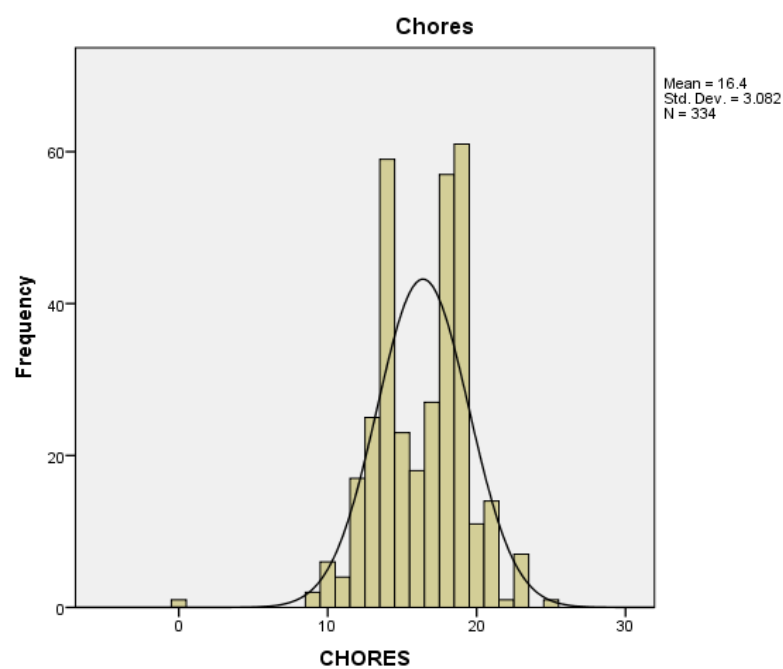*Figure 8*. Social-economic status histogram

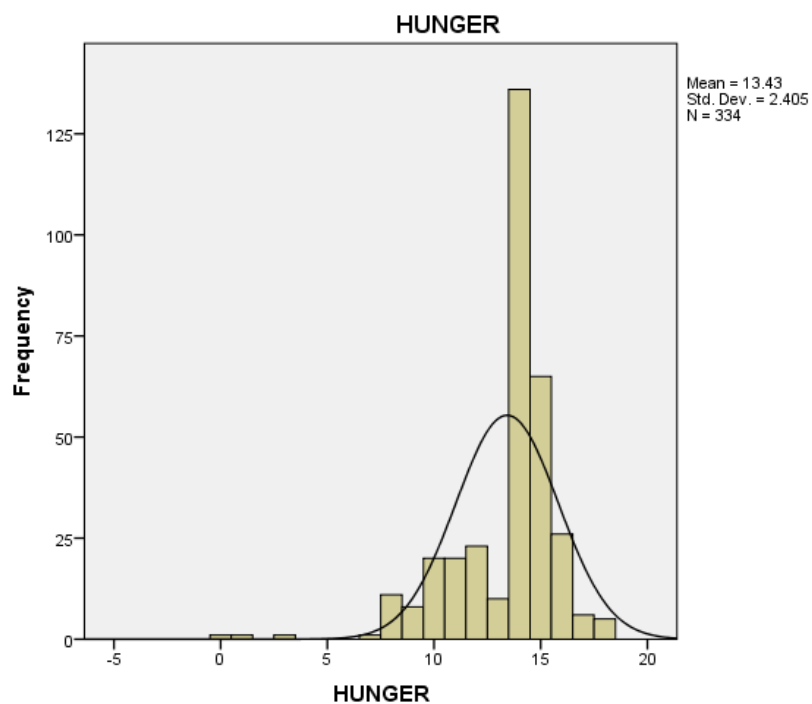*Figure 9*. Parental education histogram

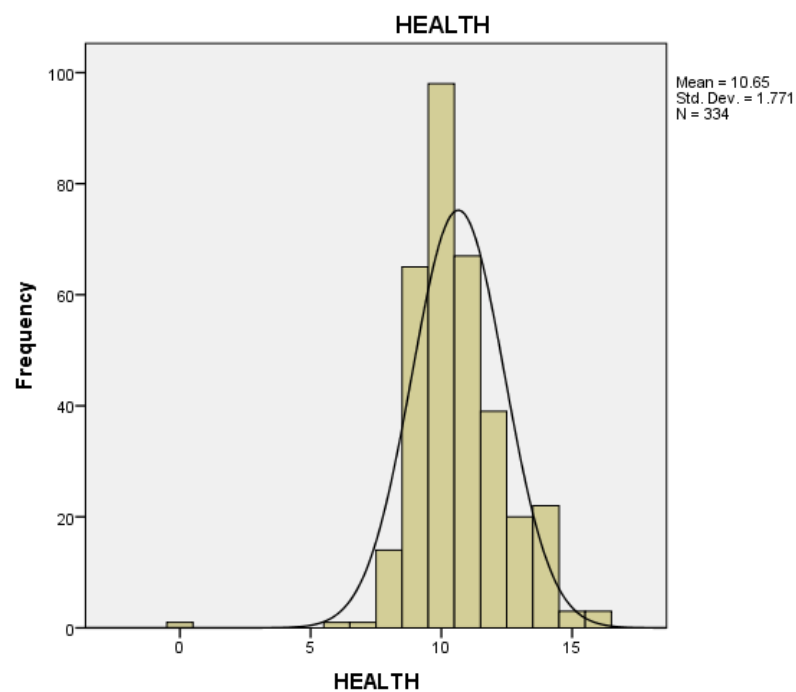*Figure 10.* Hunger histogram

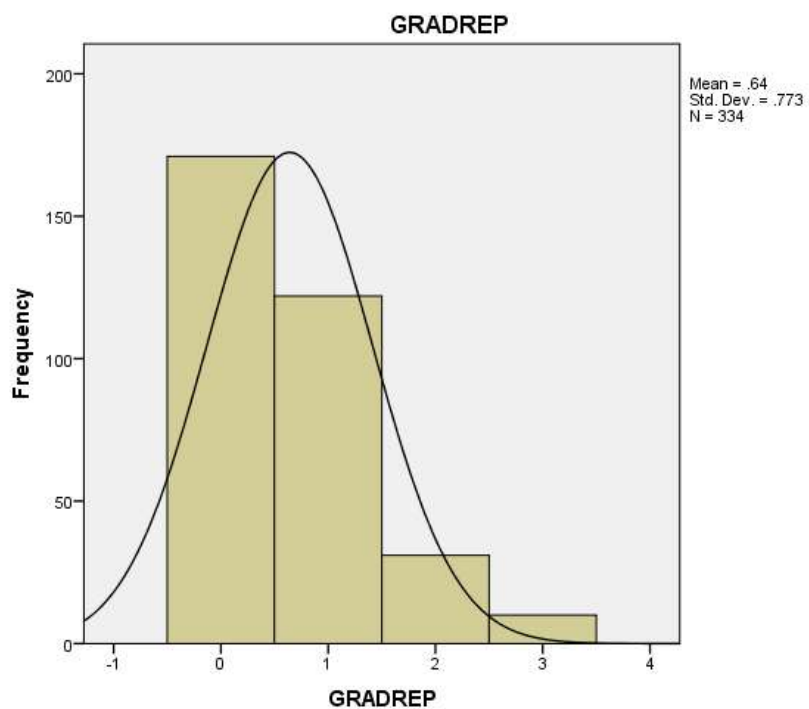*Figure 11.* Health histogram
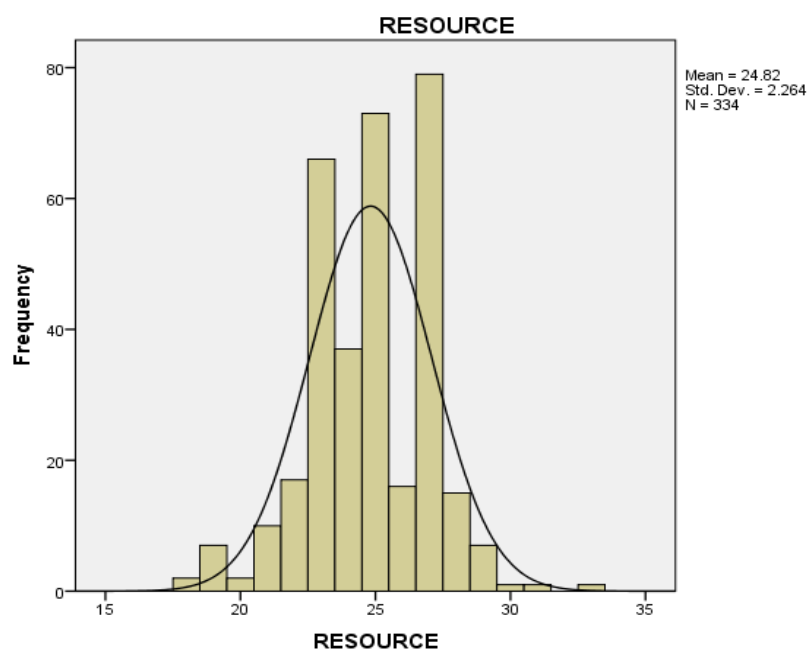
Figure 12. Grade repetition histogram
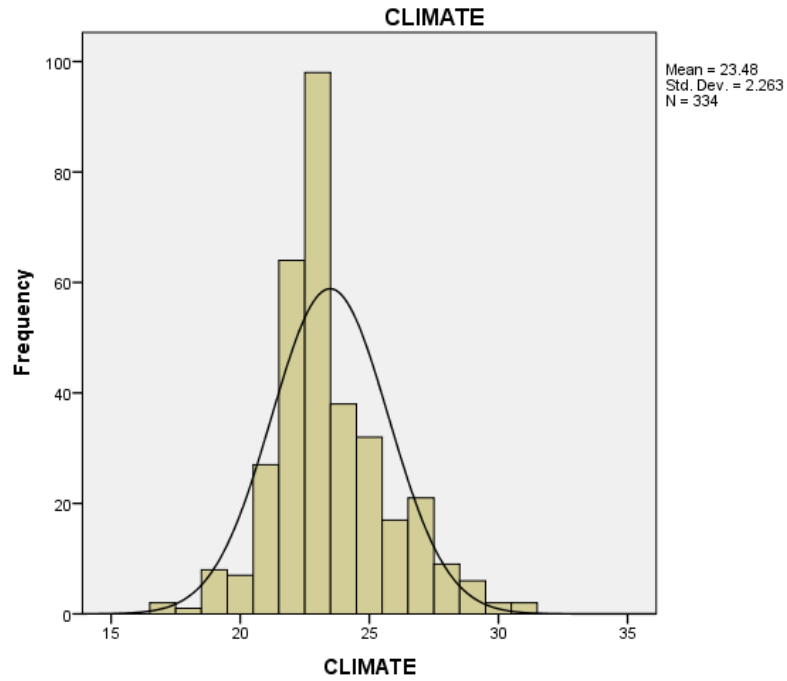

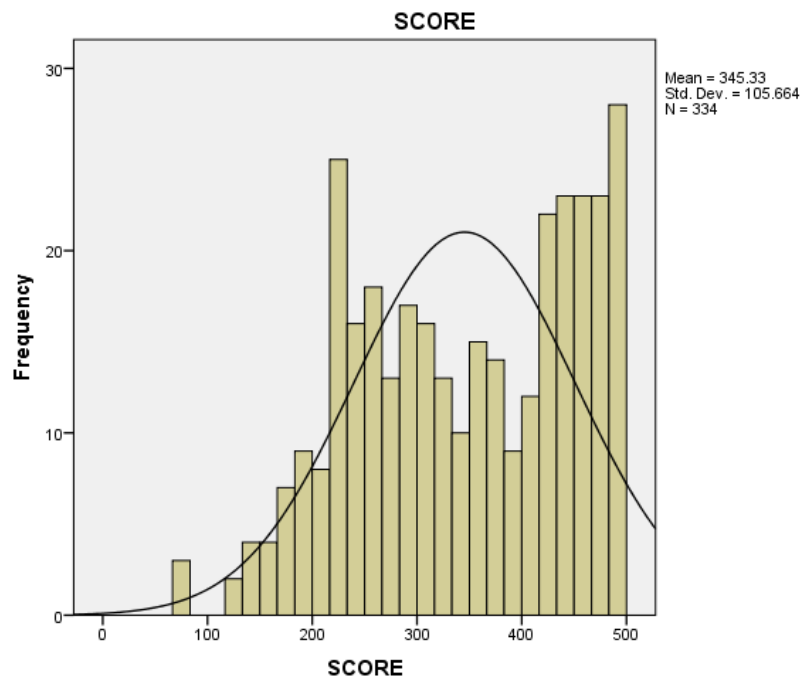*Figure 13*. School resources histogram

Figure 14. School climate histogram

Figure 15. Student test scores histogram