Determinants of school performance in Selected Public Secondary Schools in Rwanda

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Abstract

The purpose of this study was to examine the key determinants of school performance in selected public secondary schools in Rwanda. To this end, this study sought to describe educational inputs provided in selected public secondary schools and to establish the key determinants of school performance in selected public secondary schools in the country. The study was guided by Education Production Function Theory and it adopted a correlation research design. The target population involved 70 head teachers from whom 21 head teachers were randomly selected as sample in this study. Head

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teacher's questionnaire and a document review guide were used to gather necessary information on various educational inputs. Ratios, frequencies and percentages as well as regression analysis were performed to analyse data. The findings were presented in tables and graphs. It was found that the selected public secondary schools are not sufficiently provided with educational inputs and the key determinants of school performance in selected public secondary schools in Rwanda include: teacher characteristics, student-classroom ratio, student textbook ratio, students'-computer ratio, availability of physical resources, school recurrent expenditure and school total incomes as they had statistically significant coefficients. Basing on these findings, it was recommended that more investment should be made on the key determinants for greater output among public secondary schools in the country.

Key words: Determinant, school performance, input, output, Rwanda

Introduction and Background of the Study
Education has been recognized worldwide as a key factor in boosting economic development of any nation. On this basis, Barbara, Alain and Ramahatra (2003) ascertain that education is one of the most powerful instruments known for reducing poverty and inequality and for laying the basis for sustained economic growth. Likewise Woodhall (2004) emphasizes that "Education is a form of investment in human capital that yields economic benefits and contributes to a country's future wealth by increasing the productive capacity of its people." To confirm this, in its EFA global monitoring report, UNESCO (2014) insists that education plays a key role in the reduction of poverty, increasing opportunities for new jobs and accelerating economic growth and sustainable development.

In view of this key role by education in fostering development and economic growth, UNESCO (2014) recommends that countries should heavily invest in education by allocating at least 20% of their total budget and at least 6% of their GNP to education. According to the

same report this is because the major factor that is hindering the achievement of Education for All and quality of education in general is the lack of sufficient funds in education sector. This is true because in education production process the quality of education output depends on the quality and quantity of inputs and how effectively they are utilized in education system (Hanushek, 2007). With educational inputs Hanushek refers different such as teachers' characteristics, instructional resources, school physical facilities, financial resources, etc. and with educational output he refers to both school and students' academic performance. According to UNESCO (2014) one of the means to end the global learning crisis (poor quality) that is hitting many countries is to ensure equitable access to quality teachers as well as ensuring adequate provision of other resources that are needed by the teacher to make sure children are learning. To this end, as the quality of education continues to worsen due to a number of reasons including insufficient funding to provide various educational inputs (ICAI report, 2012; UNICEF, 2013), there is need to analyze educational inputs provided in public secondary schools in Rwanda with the purpose of finding out which one are key determinants of school performance.

Statement of the problem
In education production function process, the quality of educational output is a function of the quality and quantity of educational inputs given the constraints imposed by the underlying technical process. One of the key outputs of education is school performance. Therefore, school performance is function of the inputs provided and how they are utilized. However, reports have revealed that public secondary schools in Rwanda are not performing as well as they might (UNICEF, 2013; MINEDUC, 2013). Would it be the result of the educational inputs provided? This study has therefore sought to find out the key determinants of school performance in selected public secondary schools in Rwanda. The ability to do so will help policy makers and other educational stakeholders improve school performance in public secondary schools in Rwanda.

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Purpose and Objectives
The purpose of this study was to find out the key determinants of school performance in selected public secondary schools in Rwanda. To this end, the study sought to achieve the following specific objectives:
1. To describe the key inputs provided in selected public secondary schools in Rwanda.
2. To establish the key determinants of school performance in selected public secondary schools in Rwanda.

Review of Related Literature
The determinants of educational output have been the concern of many researchers. It is in this perspective that several research have been conducted to establish the key determinants of educational output. For instance, in their study conducted to measure the internal conditions for school effectiveness in the Free State of South Africa, Abraham and Morrison (2006) found that teachers' characteristics were key determinant of the school internal efficiency. Likewise, in the study conducted by Darling-Hammond (2000) it was found that among the teacher characteristics, the key determinant of school performance is the academic qualification of the teachers. Darling-Hammond further emphasizes that at high school students benefit much from teachers with Bachelor's or Master's degrees in the subjects they teach. Furthermore, teachers' professional training as well as their teaching performance had been found to be the key determinants of school performance (Ijaiya, 1998; Hanushek, Kain and Rivkin, 1998)

In their study conducted to estimate the effect of class size on scholastic achievement, Angrist and Lavy (1999) found that students-classroom ratio is a key determinant of school performance whereby schools with small students-classroom ratio perform better than those with big ratio. This had been revealed by Kweku (1979) who found student-classroom ratio to be a key determinant of the school performance. However, this is

in contradiction with the findings of the studies conducted by Goldhaber and Brewer (1997) and Hoxby (1998) who found that students-classroom ratio is not a key determinant of school performance. They states that due to other factors schools with large classes perform better than schools with small classes and vice-versa.

Other studies conducted to examine the key determinants of school performance revealed that student-textbook ratio, student-computer ratio, and the presence of a well equipped library and laboratory are key determinants of school performance. In his study conducted to evaluate the impact of World Bank support in Ghana, by White (2004) revealed that student-textbook ratio is a key determinant of school performance whereby improved provision of the recommended textbooks was a significant factor in improving academic success. The study conducted by Aloraini (2012) to investigate the impact of using multimedia on academic performance in the College of Education at King Saud University, computer was found to be a key determinant of academic achievement when it is correctly used for teaching/learning purposes. Moreover, in his study aiming at investigating resource utilization in vocational and technical education in colleges of education in South-West Nigeria, Akinfolarin (2008) revealed that availability of the key physical facilities such as library and laboratories in a school is a key factor that affects academic performance in the school system.

As far as financial resources are concerned, studies conducted to establish the determinants of school performance revealed that the school recurrent expenditure as well as the total school budget are the key determinants of the scholastic achievement. For instance in the study conducted by Figlio (1997) it was revealed that the school recurrent expenditure is a key determinant of the school performance whereby schools incurring more expenditures perform better than schools incurring less expenditures. In addition to this, the school's total income is another key determinant of the school performance whereby schools receiving more incomes perform better than schools which receive less income (Hanushek, 1981). However, Hanushek

emphasises that this is in case schools have the ability to utilize them efficiently.

Theoretical framework

This study was premised on the theory of Education Production Function (EPF). According to Hanushek (1979) in production function, the amount of output depends on the amount of inputs given the constraints imposed by the underlying technical process. In the same vein, Pritchett and Filmer (1997) adds that the production function is a theoretical construct which gives mathematical expression to the production relationship that defines the maximum output to be produced from different combinations of given sets of inputs. The production function of any firm is therefore expresses as: $Q=f(X_1,X_2,X_3, …,X_n)$ Where Q= the quantity of output and $X_1,X_2,X_3,…,X_n$ are the quantities of factor inputs (such as capital, labour, land or raw materials). To this end, the education production function for public secondary schools in Rwanda was expressed in a regression model as: $SP=a+\beta_1TC+\beta_2SCR+\beta_3STR+\beta_4SBR_4+\beta_5SCOR+\beta_6APR+\beta_7REX+\beta_8TSI$

Where: SP= School Performance   a= Constant (Coefficient of intercept)

TC=Teacher characteristics, SCR=Student-classroom ratio; STR=Student teacher ratio; SBR=Student book ratio; SCOR=Student Computer ratio; APR= Availability of physical resources, REX=Recurrent expenditure; TSI=Total school incomes

$\beta_1…\beta_8$: Regression coefficient of each educational input expressed above

Methodology

The study adopted a correlation research design. The target population involved 70 head teachers of the 70 public secondary schools in Nyamasheke and Nyarugenge districts and 2 district education officers. A sample of 21 head teachers and 2 district education officers was used. Stratified sampling, simple random sampling and purposive sampling techniques were used to select this

sample. Questionnaires for head teachers, document review schedule, and interview guide were used to collect relevant data. Expert judgment and test-retest techniques were used to test instruments' validity and reliability respectively. Descriptive statistics such as frequencies, and percentages were used to describe the provision of educational inputs and multiple regression analysis was performed to indicate the key determinants of school performance among the provided inputs. The findings were presented in tables and graphs.

Findings and Discussion
This section presents the findings, interpretation and discussions of the findings as per objectives of the study.
Teacher characteristics
Teachers' characteristics investigated in this study include teacher's academic qualification, professional training, and their teaching experience. This section presents the findings on teacher characteristics in selected public schools.
a) Academic qualification
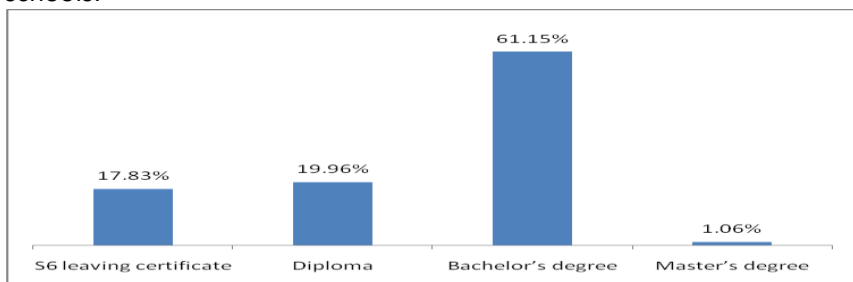Figure 1 gives an overview of teachers' qualification in selected public schools.

Figure 1: Proportion of teacher by academic qualification
Figure 1 reveals that 17.83% of teachers in selected public secondary schools hold a S6 leaving certificate, meaning that as per the guidelines of the Ministry of Education (2010) they are not qualified to teach at secondary level. Figure 1 also indicates that 19.96% and 61.15% of public secondary school teachers in the two districts hold diploma and bachelor's degree respectively. Finally, it indicates that only 1.06% of teachers in have a master's degree. According to Bali and Alvarez (2003) the academic qualification of teachers goes hand

in hand with their teaching skills and all these affect their students' academic performance.

b) Professional training
Figure 2 presents the findings on teachers' professional training in selected public schools.
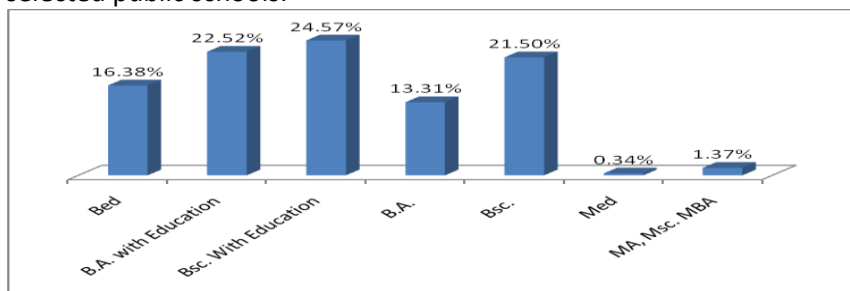

Figure 2: Proportion of teachers by professional training

Figure 2 shows that the majority (63.47%) of teachers with bachelor's degree has undergone a pedagogical course and hence they are qualified to teach. Of these teachers, 16.38% hold a bachelor of Education (BEd.), 22.52% hold a bachelor of arts with education (B.A. with Ed.) and 24.57% are holders of bachelor of science with education (BSc. with Ed.). Figure 2 further shows that more than a third (34.81%) of public secondary school teachers have not undergone any pedagogical training. Specifically, 13.31% of teachers have a bachelor of arts and 21.5% have a bachelor of science. Finally, table 2 indicates that only 0.34% and 1.37% of teachers in the two districts have a master of education degree and Master of Arts, science or business administration respectively. It is to be noted that the government of Rwanda had targeted to have at least 75% of all secondary school teachers qualified by 2015 in order to increase students' performance, (MINEDUC, 2010). To this end, Monk (1994) asserted that students who are taught by teachers who had undertaken pedagogical courses perform better than those taught by teachers who had not taken any pedagogical course.

c) Teaching experience
Figure 3 gives an account of teachers' experience in selected public secondary schools.
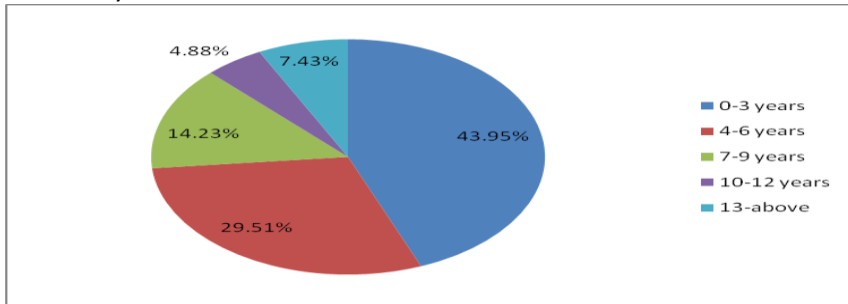

Figure 3: Proportion of teachers by teaching experience
The findings in figure 3 show that nearly a half (43.95%) of teachers in selected public secondary schools have a teaching experience of less than three years. It further indicates that 29.51% and 14.23% of public secondary school teachers have a teaching experience of between 4-6 years and 7-9 years respectively. Finally, figure 3 reveals that only 4.88% and 7.43% of selected secondary schools teachers have a teaching experience of 10-12 years and above 13 years respectively. This implies that teacher retention still needs a special attention. According to Owolabi (2007), it is the responsibility of the government to retain more experienced teachers so that they can use their experience and knowledge to improve education system. Owolabi goes on to say that teacher's experience increases his/her confidence, mastery of the content, and the way of applying pedagogical principles for effective teaching.

Availability of key physical facilities
Table 1 presents the findings on the physical facilities provided in selected public secondary schools.

Table 1: Availability of the key physical facilities

Facility	Number of schools	Percentage
Library	12	57%
Laboratory	13	61.9%
Computer lab	16	76.2%
Staff room	19	90.48%

Table 1 indicates that only 57% of selected public schools have library and only 61.9% have science laboratories. Table 1 further reveals that 76.2% and 90.48% of the selected public secondary schools have computer lab and staff room respectively. According to Khawla and Abdul (2006) the number of experiments performed by students in laboratory highly affects students' academic performance. Likewise, William and Maureen (2012) as quoted by Neji, Amba, Ukwetang, John, Nja, and Cecilia (2014) asserted that the adequacy of laboratory facilities in a school increases students' ability in problem solving critical thinking, acquisition of new scientific and technological knowledge and skills in science and mathematics. As far as library is concerned, lack of a physical library in a school denies students the time of reading. To this end, Lonsdale (2003) states that library size together with the quality of the materials it contains significantly affects students' academic learning and achievement.

Table 2: Student-input ratio

Input	Student/input Ratio
Student-teacher ratio	42/1
Student- Computer ratio	17/1
Student-Classroom ratio	38/1
Student-textbook ratio	3.9/1

Table 2 shows that student-teacher ratio in selected schools is 42/1, which means that 42 students are allocated to a single teacher. It further indicates that student-computer ratio is 17/1, meaning that seventeen students use one computer. A further look at table 2 reveals that the student-classroom ratio is 38/1. This means that there are at least 38 students in each classroom of any public secondary school. Finally, table 2 reveals that student-textbook ratio in selected public secondary schools stands at 3.9/1 which implies that one book is used by four students. According to Salem (2011) and Aloraini (2012) computer is an effective educational tool to enhance students'

academic achievement. Likewise, small ratio of students per classroom ratio is good for quality of education because when the teacher is teaching a small class he/she gets opportunity to pay attention to individual learners which is one of the key determinants of students' academic success (UNESCO, 2009).

School recurrent expenditure
Table 3 presents the summary of the amount of money spent on different educational activities/inputs in selected public secondary schools.

Table 3: Expenditure on various school inputs/activities

Item	Amount spent	Percentage
Teachers	224,265,260	15.56%
Administrative staff	39,449,120	2.74%
Support staff	68,233,145	4.73%
Casual staff	5,482,910	0.38%
Boarding	645,847,585	44.81%
Stationeries	63,013,505	4.37%
Textbooks	18,702,731	1.3%
Laboratory expenses	16,827,350	1.17%
Transport	12,216,700	0.85%
Computer repair	11,215,326	0.78%
Games and other extracurricular activities	16,137,453	1.12%
Maintenance of physical facilities	107,158,365	7.43%
Water and energy	63,482,766	4.4%
Fuel	23,579,614	1.64%
Communication bill	10,667,290	0.74%
Any other activity, not mentioned	115,050,379	7.98%
Total expenditure	**1,441,329,499**	**100%**

Table 3 indicates public schools expenditure on each item/activity. The table indicates that boarding claims the biggest share of the school expenditures (44.81%), followed by expenditure on teachers

with 15.56% of the total school expenditure. According to Hanushek (1981) school academic performance highly correlate with school expenditures. Likewise, UNESCO (2014) emphasizes that the key factor that is harmful to the quality of education is the insufficient financing of education sector.

School total income

Figure 4 gives an account of the school financial resources in the selected public secondary schools.
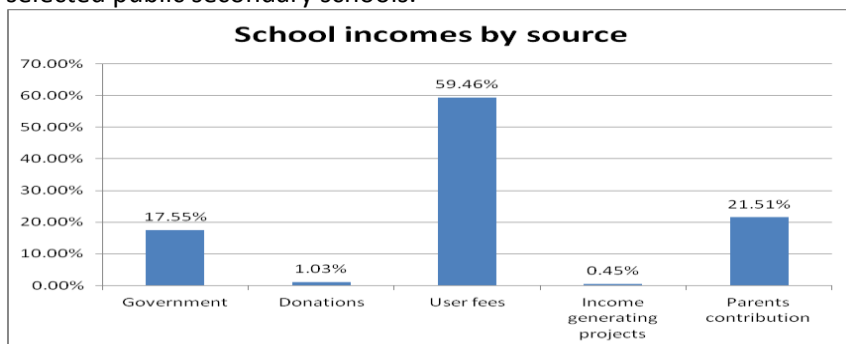

Figure 4: Amount of money from each source of funding

From figure 4 indicates that parents/guardians are the most contributors to the budget of the selected public secondary schools. For example the figure shows that while 59.46% of the total budget of public schools is paid by parents in form of school fees, another considerable share (21.51%) of the budget comes from parents in the form of parents' contributions. In total, the share of parents represents 80.97% of the budget used in public secondary schools. This is percentage is too high to the extent that the cost of education is still a burden for parents. Figure 4 further indicates the government contributes only 17.55% of the total budget which comes in the form of capitation grant. However, it is very important to note that the government's contribution exclude teacher salaries.

Determinants of school performance in selected public secondary schools in Rwanda

Table 4 gives the summary of the findings on the key determinants of school mean performance.

Table 4: Determinants of school performance

Predictors	Standardized (β) Beta weight	P-value
Teacher characteristics	.642	.011*
Student-classroom ratio	-.462	.035*
Student teacher ratio	.293	.200
Student textbook ratio	-.492	.024*
Student computer ratio	-.643	.002*
Availability of key physical resources	.374	.015*
Recurrent expenditure	.754	.000*
School income	.488	.025*

* p<.05

Dependent variable School mean performance in S6NE

R^2= .392 (39.2%) **Adjusted R^2=.389 (38.9%)**

Table 4 shows that teacher characteristics is a key determinant of school performance in public secondary schools in Nyamasheke and Nyarugenge districts (Standardized β=.642, P<0.5). The β value of .642 tells that one unit increase in teachers' characteristics (i.e. a year of experience, further training, etc.) increases school mean performance by .642. This is true when other factors are held constant. This finding gains support from the findings of a research of Abraham and Morrison (2006), Ijaiya (1998) and Darling-Hammond (2000) who found that among the teacher characteristics, the key determinants of school mean performance are teacher professional training, teaching experience, and their academic qualification.

A further look at table 4 indicates that another key determinant of school performance is the students-classroom ratio. The value of the standardized β weight (β=-.462, p<.05) indicates that as student-classroom ratio increases by 1 school mean performance decreases by 0.462. This finding concurs with the findings of

Angrist and Lavy (1999) and Kweku (1979) who found that student-classroom ratio is a key determinant of school performance where students from small classes learn better and hence their performance is better than that of their counterparts from large classes. However, this finding contradicts that of Hoxby (1998) and Goldhaber and Brewer (1997) who found that student-classroom ratio is not a key determinant of school performance.

Table 4 also reveals that other determinants of school performance are the student textbook ratio, and student-computer ratio. The standardized β value (β=-.492, p<.05) for student-textbook ratio indicates that as the student textbook ratio increases by 1, school mean performance decreases by .492. Likewise, the value of the standardized β (β=-.643, p<.05) for student-computer ratio indicates that a one unit increase in student computer ratio decreases school mean performance by .643. These finding go hand in hand with the finding of White (2004) who found that student-textbook ratio is a key factor that determines school performance where schools with more recommended textbooks performed better than schools with less recommended textbooks. Moreover, the finding supports that of Aloraini (2012) who found that computer is a key determinant of academic achievement when it is correctly used for teaching/learning purposes.

Table 4 further indicates that availability of key physical resources (library and laboratories) (β=.374, p<.05), the school's recurrent expenditure (β=.754, p<000) and the school's general income (β=.488, p<.05) are the key determinants of school performance. The β value of .374, for availability of key physical resources indicates that availability of either a library or laboratory increases school performance by .374 and the β value of .754 for recurrent expenditure means that one unit of increase in the recurrent expenditure increases school performance by .754 and a β value of .488 for the school income indicates that one unit of increase in the school income increases school performance by .488. These findings

partially support the findings of Akinfolarin (2008), Figlio (1997) and Hanushek (1981) who found that availability of library, laboratory, the school recurrent expenditure and the school total incomes are the key determinants of school performance only when the school system has the ability to utilize them efficiently.

Conclusion and Recommendations

Based on the findings that only 61.15% of teachers in public secondary schools have a bachelor's degree, among them only 63.81% have taken a pedagogical course, and only 56.05% have an experience of more than three years, and given that only 57% and 61.9% of the schools have library and laboratory respectively, it is ordered to come to the conclusion and generalization that public secondary schools are not sufficiently provided with educational inputs.

Furthermore based on the findings that the key determinants of school mean performance are: teacher characteristics, student-classroom ratio, student textbook ratio, student-computer ratio, availability of physical resources, school recurrent expenditure and school total incomes as they had statistically significant coefficients. Therefore, it is logical to conclude and generalize that school mean performance in public secondary schools is a function of the amount and quality of these inputs such as teacher characteristics, student-classroom ratio, student textbook ratio, student-computer ratio, availability of physical resources, school recurrent expenditure and school total incomes. Therefore, the Ministry of Education (MINEDUC) is recommended to invest more on the key determinants of school inputs in order to enhance school performance. School leaders are also recommended to mobilize additional resources from donors and initiate income generating projects in order to supplement their budget.

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