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THE EFFICIENCY OF SECONDARY EDUCATION IN SUB-SAHARAN AFRICA EESSA PROJECT

THE CASE OF MALAWI

Research Report

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Acknowledgement

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Acronyms

CDSS	Conventional or Community Day Secondary Schools
CE	Cost Efficiency
CSS	Conventional Secondary School
DEA	Data Envelopment Analysis
DMU	Decision Making Unit
GER	Gross Enrolment Rate
Govt	Government
HT	Headteacher
IIEP	International Institute for Educational Planning
IQR	Interquartile range
ISE	Innovation in Secondary Education
LIC	Low Income Countries
LMICs	Low Middle-Income Countries
MF	MasterCard Foundation
MWK	Malawian Kwacha
NER	Net Enrolment Rate
Non-USE	Non-Universal Secondary Education
OECD	Organisation for Economic Co-operation and Development
PD	Professional development
PTA	Parents and Teachers Association
SD	Standard Deviation
SSA	Sub-Sahara Africa
STR	Student Teacher Ratio
TE	Technical Efficiency
UIS	UNESCO Institute for Statistics
UPE	Universal Primary Education
USD	US dollar
VRS	Variable Returns to Scale

Executive summary

Introduction

There is limited research on secondary education in sub-Saharan Africa that explores the key factors which can promote efficient and effective secondary schools. What there is includes IIEP studies by Lewin and Caillods (2001), and the outputs from the World Bank's Secondary Education in Africa programme that includes analysis of costs and efficiency (Lewin 2008). Knowledge gaps remain with the risk that African governments embarking on large scale reforms in secondary education may invest in ways that fail to identify the components of the system and processes that drive efficient and effective delivery of secondary education, and therefore which areas to prioritize investment to achieve universal access. This study of secondary school efficiency and effectiveness in Malawi responds to this gap and provides evidence to inform discussions about key reforms in secondary education to improve quality and equitable access, especially for disadvantaged groups.

Study Methods and Sample

Using both survey and case study data, the study analysed school efficiency in different types and sizes of secondary schools. The main output measure was final examination grades. For an estimation of inputs, teacher numbers, student-teacher ratio, class sizes, teacher quality (qualified/unqualified), and other infrastructure and material resources in schools was used. The samples sizes for the analysis was based on 88 secondary schools.

School Efficiency – Applied definitions in the study

In this study we have defined and applied school efficiency in three ways.

First, efficient schools produce good learning outcomes, measured in terms of examination results with key inputs. This definition makes it easy to quantify efficiency because examination results are a measurable entity. In our case, we were interested in understanding the relationship between inputs (e.g., student teacher ratio, number of computers per students and per teacher and school infrastructure) and outputs (examination pass rates), hence mimicking a production function. This is referred to in the literature as *technical efficiency* and describes the transformation of a mix of inputs into desirable learning outcomes.

Second, efficient schools manage their human and financial resources well. This definition focuses on the internal management of schools. We drew on case studies of selected schools for insights into the challenges schools face in accessing and managing their resources efficiently. Schools make choices (or choices are made for them by de facto) on what purchases or inputs to prioritize, who to recruit or sometimes simply accept teachers assigned to them from national or district authorities, irrespective of their competence. When there is a funding gap, schools may appeal to parents to fill this gap, others may decide to restructure, e.g., combine classes or deploy resources away from activities that can impact on the quality of teaching and learning. All of these decisions have direct consequences on school efficiency and outcomes.

Third, efficient schools can be defined as schools which produce good results (e.g. examination results) for all students at costs that are affordable and sustainable. We were interested in whether secondary schools in Malawi can achieve the same learning outcomes for all students at lower costs or, whether some types of secondary schools are able to achieve higher learning outcomes at relatively lower costs.

Key Findings and Policy Recommendations

- It is striking that students who attend Conventional Secondary Schools (CSS) mostly in urban areas live much closer to their schools which are often boarding schools, whereas students who attend Community Day Secondary Schools (CDSS) live much further away and walk longer distances to school. Boarding schools cost more and for the poor will be inaccessible. Future

growth in access to secondary education in Malawi will have to come from expansion of access to community day secondary schools, but these need more investment to improve their quality.

- Judging from the data, CDSS tend to be smaller schools. Urban schools enrol twice as many students as schools in rural areas. Peri urban schools are of medium size. This presents challenges for expansion of secondary education at affordable costs. For CSS in towns and cities, a policy option would be to increase the ratio of day to boarding students since CSS students live much closer to their schools compared to CDSS.

- The practice of offering remedial classes for underperforming students in private and CSS improves their pass rates but not in the case of CDSS. The bigger impact of remedial classes is also correlated with repetitions. CDSS provide greater access to poor households than CSS and need an injection of resources to improve the quality of teaching and learning. Teaching in CDSS has to be made attractive to attract the best teachers to improve learning outcomes.

- All schools rely on additional income - representing on average about 81% of total funding. Private schools receive almost all their income from fees (about 95%), and although are considered low-fee paying schools their costs would exclude students from the poorest background. But, they provide relatively better quality than CDSS which cost much less to attend. If the quality of CDSS improves at affordable costs they could compete with low-fee private schools for students and provide choice for poor households. The reliance on school charges and PTA contributions can create inequitable access to quality secondary education in Malawi. With over 80 percent of students from disadvantaged backgrounds, relying on fees and income from households, CDSS in particular are unlikely to have enough recurrent funds to run efficiently.

- The number of PCs connected to the internet, PCs for school management and PCs per student across all school types is very low. Improving IT infrastructure and use in schools should be part of a medium to long-term strategy to improve the quality of secondary education in Malawi. This is because of its potential to enrich the quality of the learning experience. Although this study did not investigate school curriculum issues directly, the eight case studies indicated schools were concerned with accessing adequate textbooks and learning materials and improving basic infrastructure. A 21st century secondary education has to include access to PCs and the internet. This has to, at least, be part of a long-term vision. Inequitable access to computers can become another tool for perpetuating inequitable access to quality secondary education. Access to ICT in secondary schools interconnects with accessibility and connectivity to electricity. This may be the biggest challenge to improving ICT in rural secondary schools in addition to other relevant elements such as, finance, infrastructure, personnel and their training, software, and textbooks.

- The indications from the analysis of costs suggests that secondary schools in Malawi are not sufficiently resourced to increase learning outcomes for most students. Pass rates are generally high and easier to achieve for most schools. But for schools to improve their quality for all, i.e. increase pass rate with distinctions, then a better use of the combination of current inputs or increased inputs will be required. We found that about 22 percent of schools (19 out of the 88) are further away from the efficiency frontier when we base the learning output measure purely on pass rates, but on pass rates with distinction, about 72 percent of schools fail to reach this efficiency frontier. Thus, if we determine high quality of secondary education by the ability of schools to reach high pass rates with distinction than currently is the case, then most secondary schools in Malawi would not meet this mark.

- Schools with a low to moderate degree of wealth disadvantage are more efficient than those whose proportion of disadvantage students is high. Technical efficiency levels in poorer schools are about half the levels in more advantaged schools. This means students in rural schools are receiving relatively poor quality secondary education. This adds to the importance of increasing investment in secondary education in rural areas to improve equity in quality.

- Insights into the factors which make schools efficient in the Malawi context can be used by policy makers to develop standards for improving quality. From our analysis the following are key, ensuring (a) a higher proportion of qualified teachers compared to non-qualified teachers; (b) class sizes are reduced and school management is improved; (c) all secondary school teachers, irrespective of their location have good access to professional development; (d) schools and stakeholders have good information on how well students are performing compared to other schools; (e) expansion of access to secondary education goes with increased resources. Rapid increases in student enrolment can have a negative knock on effect on efficiency if not accompanied by increasing resources. (f) schools maintain a low wage to expenditure ratio. Moderate increases in enrolment and accompanied by increased expenditure can ensure the quality of secondary education is maintained.

- There needs to be a robust inspection and advisory system in place to ensure that all secondary schools in Malawi meet minimum standards of practice considered appropriate, but also that they have the capacity to maximise learning outcomes for all. Improving the quality and availability of data from secondary schools will be useful in monitoring capacity and quality. It will also ensure that new investment in secondary education is based on verifiable performance indicators.

- Parent Teacher Associations are contributing significantly to the cost of running secondary schools in Malawi. Evidence from the case studies suggest that this can be a source of inequitable quality in secondary education. Richer communities provide more and therefore add to the quality of secondary schools serving in those communities. The policy of free secondary education has to address the role of PTAs and ensure that schools in rural areas are not disadvantaged as a result of PTA contributions filling in financing gaps in the implementation of the policy.

- Internal management of schools is crucial to running an efficient school. Ideally, an efficient school is where the interaction between different stakeholders is cordial and mutually reinforcing so that the teachers are happy to teach, parents are willing to send their children to school, and children enjoy the learning process. What is clear from the case studies is the lack of transparent reportage on efficiency through an effective governance system.

- The Malawi 2016 National Education Policy notes that governance and management of secondary education is problematic because of understaffing, unavailability of laboratories, inadequate funding, limited classroom capacity, lack of relevant and responsive curriculum and poor management of resources (GoM 2016: 6). One of the policy objective is to improve the operations and efficiency of the education system through good governance and management to deliver education services efficiently and effectively. The policy strategy to achieve this is through decentralized management of secondary schools; improved conditions of service for secondary school teachers; improved regulatory framework on stakeholder participation in the delivery of secondary education; increased funding levels to secondary education; strengthening capacity of secondary education governance and management at all levels; and finally, improvements in accountability and transparency in running secondary schools in Malawi. These policies target the system, when as seen in this study, schools function face different financial and logistical challenges.

- There are indirect political economy issues arising from the findings of the research. Creating a secondary school system that works to improve quality for all will be achieved if only the ecosystem factors that influence how schools are run receive policy attention. School governing boards must have real power to manage schools and hold headteachers and teachers accountable. Training for headteachers in the management of secondary schools also needs investment and policy attention so headteachers are better able to offer quality leadership that can produce efficient and effective secondary schools in Malawi. The incentive for secondary schools to operate more efficiently and be held accountable for the resources they consume is lacking

- What are the implications of the findings for providing 'free' secondary education in Malawi. First, the country needs to ensure there is improved access for the poor at the primary level to make free secondary education equitable. Second, if secondary education is made free for all irrespective of whether a student attends a CDSS or CSS, this will make secondary education highly inequitable. To approach more equitable access, the government should consider making all day attendance free whilst at the same time increase resources to CDSS to raise quality. Households that wish to access boarding secondary education are more likely to be able to afford it and therefore should not benefit from 'free' secondary education. As our analysis shows, boarding CSS cost much more but also have the capacity to generate additional income that CDSS cannot match. A combination of free day schools and improved investment in community secondary schools will constitute a pro-poor policy which is also more sustainable. In effect, a free secondary education policy should seek to close the quality gap between CSS and CDSS. CSS in towns and cities may have more capacity to increase enrolment than CDSS, and a mapping exercise could determine which can do so, and the excess capacity used to increase enrolment of day students.

1. Introduction

1.1.   Background to the Research

Secondary Education has recently received much attention by Sub-Saharan African (SSA) governments in response to increased demand necessitated by the success of universal primary education in the last 15 years. The push to get many children into school was given a boost at the World Education Forum in Dakar in 2000, and by 2015, although many countries were yet to achieve universal primary education (UPE), enough progress had been made to exert pressure on access to secondary education (UNESCO 2014).

Although access to secondary education in SSA has increased, it is still much lower than in the developed world. Recent analysis of secondary school gross enrolment (GER) data show that the rates in 1960 were only around 52-53% for the OECD countries and the Eastern European and Central Asian countries but had reached 100% by 2010. In SSA, GER increased from a very low rate of only 3% in 1960, and reached 44% in 2010, which is close to the OECD average in 1960 (Glewee & Muralidharan 2015). Although participation in lower secondary has more than doubled, few complete and progress to upper secondary. Low entry and completion rates at this level suggests that much more is needed to make secondary schools more efficient and effective to improve access, completion and learning outcomes.

The most recent analysis of data from SSA using data supplied to UIS (Lewin 2018 et al forthcoming) shows that Low Income Countries (LICs) and Low Middle-Income Countries (LMICs) in SSA now have similar average Gross Enrolment Rates (GERs) at primary level. These now average 102% and 103% respectively. However primary completion rates do differ and average 50% in LICs and 75% in LMICs indicating that as many as half of children are not completing primary school on-schedule successfully in LICs and for that reason alone will not enter secondary schools. At the same time 30% of students in the primary school systems are overage in LICs and 21% in LMICs. Low completion rates are correlated with over age enrolment and progression (Lewin and Akyeampong 2009). The problem of over-age children failing to complete primary, or arriving at the transition to secondary two or more years overage puts a cap on the possible expansion of secondary schooling.

GERs for the whole of secondary school in SSA average nearly 40% in LICs and 70% in LMICs. The NER for Lower Secondary is 60% in LICs and about 80% in LMICs. The implication is that less than half of children complete lower secondary and fewer do so on schedule with appropriate levels of learning achievement. The largest gaps in school enrolment between rich and poor children are also at secondary level in LICs. These gaps are much larger than those correlated with gender. LICs have far fewer students at tertiary level with only 7% GER in LICs compared to 20% in LMICs. This creates a constraint on the training of graduate level teachers for secondary schools.

Table 1.1. Participation in Primary and Secondary in LICs and LMICs in SSA

	GER Primary	Primary completion	GER secondary	NER Lower secondary	GER tertiary
LICs	102	49	38	59	7
LMICs	103	74	65	82	20

Source: UIS 2017

Spending more on secondary education is unlikely to make it more effective and efficient unless it is used in ways that can improve quality (Lewin and Caillods 2001, Glewee & Muralidharan 2015). It is possible for similar schools with students from similar socio-economic backgrounds to achieve similar outcomes but with different levels of resources. This raises questions about school efficiency – first, whether schools have the basic resources and infrastructure to function effectively and efficiently, and second, the extent to which the resources are used efficiently to improve quality and increase learning outcomes.

Putting in place robust school management systems can help to reduce the risk of financial mismanagement, ensure that resources are utilised appropriately to improve learning outcomes. Also, the ability of schools to make resource, teacher management and curriculum decisions that suit their context and circumstances is important, as is their ability to attract and retain qualified teachers. How schools optimise teacher workloads, utilise non-teaching staff, provide or support access to professional development activities for teachers are important vectors for achieving quality secondary education.

There is a limited amount of research on secondary education in sub-Saharan African context on the key factors that promote efficient and effective secondary schools. What there is includes IIEP studies by Lewin and Caillods (2001), and the outputs from the World Bank's Secondary Education in Africa programme that includes analysis of costs and efficiency (Lewin 2008). Knowledge gaps remain with the risk that African governments embarking on large scale reforms in secondary education may invest in ways that fail to identify the components of the system and processes that drive efficient and effective delivery of secondary education. As Grauwe & Varghese (2000) point out:

"reforms have very often targeted the provision of inputs in the system, rather than the processes of teaching and decision-making schools, which are crucial in explaining differences in quality. Secondly, many reforms in the past tried to focus on isolated components of the system, for instance, the teacher or the textbook. However, improving the efficiency of individual components does not automatically lead to improving an organization. Processes are contextual, and their improvement depends upon the capacity of each school to become an effective and efficient organization. Thirdly, reforms (often are) not adapted to the very varied needs of the individual schools, characterized as they were by a general, system-wide strategy. Schools do not all function in the same way and reform strategies need to recognize this".

As Lewin (2015) notes "Conventional public-school systems provide few incentives to schools to use teachers efficiently and timetable teaching to maximise the time on task of students. Absenteeism is often not sanctioned appropriately, and terms and conditions of service may encourage casual leave and unjustified sick leave and reduce teaching time. Over large lower grade classes and under size higher grades in the same school are unlikely to be pedagogically efficient; they are certainly not equitable. Managing schools is fundamentally about managing learning as much as managing teachers". This highlights the importance of formative assessment linked to intervention, reducing rather than magnifying differences in achievement between groups of students, and monitoring and providing incentives that improve teacher performance and productivity.

Thus, it is important to develop a holistic understanding of the inputs, processes and factors which can work together to improve the quality of secondary education in African schools. Without a holistic approach to improving efficiency of secondary education, reforms in the sector will not produce equitable learning experiences that can lead to improved learning for all secondary school students.

1.2. Background to the contract

Innovation in Secondary Education (ISE) is among one of MasterCard Foundation's (MF) initiative within its Education and Learning Program. The ISE initiative seeks to encourage innovation to promote equitable access and quality of secondary education, with a focus on the poor and disadvantaged. The MF has committed a total of $35.5 million for twelve ISE projects in Cote d'Ivoire, Kenya, Malawi, Rwanda, Senegal, Tanzania and Uganda. Of this amount, $22 million has been committed through The Partnership to Strengthen Innovation in Secondary Education (PSIPSE). PSIPSE is a funder collaborative that works to increase secondary education access and improve learning outcomes for disadvantaged young people in developing countries. To achieve this goal gaps in the research on secondary education in sub-Sahara Africa (SSA) needs to be addressed, particularly research that will expand knowledge and understanding of secondary schools' practices and processes in terms of governance, staff recruitment and deployment, financial management, human resource distribution and utilization with a view to identifying and generating greater efficiencies through improved processes.

The TOR for this research outlined the following objectives for the investigation into the efficiency and effectiveness of secondary education in SSA:

1. Review and document evidence, background literature and policies on school efficiency in the secondary education context,
2. Develop a theoretical framework to structure evidence and approaches to improving school level efficiency
3. Assess how secondary schools are governed, managed, resourced, monitored and how resources are allocated and utilized against a benchmark or a framework,
4. Identify opportunities to increase the efficiency of secondary schools through implementation of local solutions and actionable interventions, and
5. Recommend contextually relevant and innovative school efficiency measures to empower schools to sustainably finance, effectively govern, and improve the quality of secondary education.

Objectives 1 and 2 are addressed in the inception report and used to frame the research design and analysis in this report.

1.3.   Structure of the report

The report has six sections. In the Section 2, we include a description of the Malawian secondary school system and in Section 3 we outline the design of the research (i.e. research questions and sampling framework). Section 4 includes a discussion on definitions of efficiency and how they have been applied in this study. Section 5 contains the empirical results and in Section 6 we offer some concluding remarks. Section 7 contains some policy implications. In the technical Appendix 1 we present the definitions and conceptualisation of efficiency applied in this study and explain the technique employed to measure efficiency, that is, Data Envelopment Analysis (DEA) in more detail. In Appendix 2 we include Malawi's questionnaire which was used to collect data for the analysis in this country report.

In the empirical analysis (Section 5), the presentation of results is carried out in three steps. Firstly, we employ raw measures / summary statistics to understand differences in resources, organisation, training, policies etc. between school types and by school location which may be linked to efficiency. Secondly, we present some preliminary analysis on cost and equity and their relationship to efficiency. Thirdly, we carry out an efficiency analysis (DEA) to examine the profile of efficiency of secondary schools in Malawi, based on achievement data (exit examination results) and flows (completion rates) as well as by relating the ranking of efficiency to overall schools' and teachers' characteristics. This allows us to identify the profile of efficient secondary schools.

2. Secondary Education in Malawi

2.1. A Review of National Policies

This section gives a brief history of national policy on secondary schooling in Malawi. It reviews policy documents that have shaped the development of secondary education since democratisation in 1994. The beginning of education planning in Malawi dates to its independence in 1964, when the Government of Malawi contacted the American Council of Education to conduct a survey on, among others, Malawi's education needs for social and economic progress, and thereafter, submit plans for attaining key targets in education. The survey, which assessed all levels of formal education, influenced the development of Malawi from 1964 until 1972 and subsequent planning exercises up to 1994 (Government of Malawi, 2008).

2.1.1. The First Education Plan (1973)

The first education plan in Malawi was a product of the Johnson (1964) report which, among other things, recommended an expansion of secondary education. Policy in newly independent Malawi linked education, particularly at post-primary level, to the demands of the labour market rather than population growth (Chimombo *et al,* 2014). The First Education Plan was therefore very cautious in advocating a rapid increase in post primary education because of its concern that this would lead to a fall in standards (Government of Malawi 1973:53). It is a concern that has continued to influence current policies on secondary education in Malawi (Chimombo *et al,* 2014). After a decision was made to liberalise the secondary education sector in 1994 to allow more private participation, complaints continued about the impact of this liberalization policy on the quality of secondary education. Initially, expansion was largely absorbed through growth in the then Malawi College of Distance Education (MCDE). MCDE is a department under the Ministry of Education responsible for provision of education and training through open and distance learning methods. This First Education plan was not considered a success because of perceived flaws in how it was to be implemented, such as a lack of an evaluation plan, specific implementation budget and poor management (Mwale 1998: xv).

2.1.2. The Second Education Plan (EDPII 1985-95)

The second education plan (EDPII) incorporated all levels of formal education as well as various parastatal organizations associated with the Ministry of Education, Science and Technology at that time. It also aimed to achieve a proper balance in the levels of physical and human resources allocated to all levels of the education system. Although it incorporated all levels of formal education as well as various parastatal organizations associated with the Ministry of Education, Science and Technology (Government of Malawi, 2008), Chimombo *et al* (2014) argue that this plan began to shift the emphasis away from postsecondary education in favour of primary education. It sought to improve access, quality and efficiency, particularly at the primary level. EDPII set the target of achieving primary NER of 85% by 1995, through a gradual phasing out of school fees. By 1993/94, the GER was estimated at 70%. At the secondary level, the aim of the EDPII was to keep secondary school education opportunities geared to serving economic development rather than expand rapidly in response to demand (Republic of Malawi, 1985:5). The second education plan faced the same problem as the first plan – the lack of comprehensive financial resources to implement the plan. Additionally, a shortage of teachers and learning materials, high dropout and repetition rates meant achieving an effective and efficient education system became difficult under the plan (Mwale and Chimombo, 1994).

2.1.3. The Free Primary Education Policy (FPE) 1994

The government of Malawi introduced a school fee waiver scheme during the second half of the EDPII period. However, the new democratic regime that came into power in 1994 decided to make primary education free by abolishing tuition fees, school fund/extra fees and textbook contribution. In some

cases, especially in urban areas, this also meant the abolition of other fees such as telephone and water fees. A uniform no longer became a requirement for attending school (Ministry of Education, MOE, 1996). As noted by Mwale and Chimombo (1994), the policy also contemplated the introduction of community secondary schools to expand secondary education. Although primary schools in Malawi had been categorized into (a) assisted (those under the responsibility of local education authorities at the district level) and, (b) unassisted schools (those established by local communities), under the PE policy the central government assumed the responsibility of financing these schools (Ministry of Education, MOE, 1995).

2.1.4.   *Policy and Investment Framework (PIF) (1995)*

Unlike the first two education plans which lacked clear budget allocation as an integral part of implementation plans, the sector-wide Policy and Investment Framework (PIF) for education in 1995 emphasised the financial arrangements for expanded access to education. The PIF included a specific aim of supporting the provision of non-government secondary schools to complement public provision. The PIF envisaged that 10% of primary and 25% of secondary students would be educated by non-government providers by 2012. However, Lewin and Sayed (2005:73) in an assessment identified gaps in the PIF, largely in terms of frameworks to develop, support, regulate, monitor and evaluate non-government providers. A review of the initial PIF revealed that it was not based on thorough and comprehensive data and analyses (Kirby et al. 1998). A second PIF was developed for the period 2000-2012. A key objective was that selection into secondary education would be based on the principle of local catchment area, in pursuance of the goal of creating a national day secondary school system. The government was to withdraw funding of boarding secondary education, and instead parents were to bear the full costs. It also indicated that parents would be encouraged to invest in the education of their children by providing approximately 50% of the cost, with government progressively giving schools greater autonomy and accountability in the utilization of their school finances as a way of increasing school effectiveness and higher academic achievement.

2.1.5.   *The introduction of CDSS (1999)*

In January 1999, the Ministry of Education directed that District Education Centres (DECs) were to be converted into Community Day Secondary Schools (CDSSs). As the forthcoming analysis and other studies (Chimombo *et al,* 2014; Gwede 2004) demonstrate, CDSSs are perceived to be of lower status compared to other secondary schools partly because they lack qualified teachers, libraries and laboratories and have poor infrastructure. Besides, many CDSSs lack teaching and learning materials to promote effective teaching (Mac Jessie-Mbewe, 2004). Although the aim of turning DECs into community secondary schools was to improve access to quality secondary education, the poor and uneven implementation of the policy meant that CDSSs did not match the quality of conventional secondary schools (Chinseu-Moyo, 2007).

2.1.6.   *The National Education Sector Plan (NESP) (2008-17)*

In 2008, Malawi developed a National Education Sector Plan (NESP) for a ten-year period (2008-2017) and which drew on the first and second education development plans, the PIF and the Long-term Development Perspective for Malawi (Vision 2020). The goals and objectives focused on achieving equitable access to education, improved quality and relevant education, and improved governance and management.

The NESP projected rapid increases in enrolment (50% increase from 2007 to 2012, and 130% increase from 2007 to 2017) in secondary schooling. This was to be achieved through a 30% increase in enrolment in Government-supported schools in 2012 to an increase of 90% in 2017, an increase in enrolment in Open Schools from nearly 7,000 in 2007 to 19,000 in 2012 and 34,000 in 2017 and increases in private enrolment of 90% by 2012 and 230% by 2017 (NESP 2008:17). These were very

ambitious goals and raises questions about financing and sustainability of expansion of secondary education in Malawi.

2.1.7. *The National Education Policy (2013 and 2016)*

The NEP outlines the education sector's priorities and defines the country's education policies. One of its objectives was to improve the operations and efficiency of the education system through good governance and management to deliver education services efficiently and effectively.The policy acknowledged that the CDSSs had the largest proportion of students attending secondary school and yet are poorly resourced in terms of qualified teachers, teaching and learning materials, and basic infrastructure. It notes that governance and management of secondary education faces challenges because of understaffing, unavailability of laboratories, inadequate funding, limited classroom capacity, lack of relevant and responsive curriculum and poor management of resources.

2.1.8. Summary

In summary, education policy and planning in Malawi has put more emphasis on expansion of primary education with minor reforms to the secondary education sub-sector. The introduction of community day secondary schools (CDSS) was to make secondary education more accessible. The intention to withdraw government funding of boarding secondary education and instead plough resources into day secondary schools could be an attempt to make secondary education in Malawi more equitable. But, policy to expand access to secondary education has not focused sufficient attention on the issue of costs to the poorest households.   So what are the costs and what is the affordablity judgement

The decision to give secondary schools greater autonomy in how they utilise their finances would give schools control over their finances to improve efficiency and increase effectiveness. It will also depend on the training secondary school heads get in the efficient management of their resources to improve quality and efficiency.

The introduction of CDSSs is clearly an attempt to decentralize provision of secondary education, but there is little indication from policy documents of how resources should be decentralized to provide efficient and effective delivery of secondary education. Also, the invitation to the private sector to become partners in providing secondary education does not include clear guidelines on how this would ensure the costs to households are not beyond the amounts poor households can afford, especially where they serve disadvantaged areas.

Key to achieving a more equitable and efficient secondary school system is the availability and effective utilization of qualified teachers and infrastructure and the management of costs to households . Although, recent education policy in Malawi has articulated a vision of expansion underpinned by ambitious growth targets (e.g. a 130% increase in secondary school enrolment from 2007 to 2017) what happened by 2017, a comprehensive analysis of the capacity of secondary schools in the public and private sectors to manage equitable expansion based on analysis of school efficiency is lacking.

2.2.   Typology of Secondary Schools in Malawi

The legal framework of education in Malawi was for a long time based on its 1962 Education Act, until a new Education Act was enacted in 2013. Malawi's constitution defines the nation's educational objectives and regulates responsibilities for education among three key players—the state, religious groups and the private sector. Religious groups control about 60% of primary schools and many secondary schools. About 25% of secondary schools are Conventional Secondary Schools (CSS), 49% are Community Day Secondary Schools (CDSS). These schools are all under government control. About 25% of secondary schools are privately owned with less than 1% registered as Open Day Secondary Schools (ODSS).

Government and private schools fall into 4 types: Conventional Secondary Schools (CSS), Community Day Secondary Schools (CDSS), Open Day Secondary Schools (ODSS) and Private Secondary Schools secondary. CDSS are the least expensive charging the lowest school fees and are the least selective of the government secondary schools. They also enroll most secondary school students in Malawi. Many CDSS operate with very high student teacher ratios, have few qualified teachers and lack instructional resources as reflected by the profile of the case studies (see table 3 appendix 1). Many CDSS teachers are former primary school teachers and therefore lack the official qualification to teach at the secondary school level. Conventional Secondary Schools (CSS) are the old core government secondary schools. They are more selective and expensive than the CDSS. Among the CSS are a smaller group of schools known as "national secondary schools". They provide the highest quality of secondary education, and often are well-established boarding schools. Most, started as mission or religious schools. Another group of CSSs serve students within a district and select students mostly from local nearby communities. These schools operate as day secondary schools. There are also the 'Open Day Secondary School' (ODSS) which operate in parallel with the CDSS or CSSs. Using SCSS or CSS existing structures, ODSS mostly recruit teachers from CSSs to teach part-time and are paid by hour. ODSS can be described as 'shadow' secondary schools and often are not transparent in disclosing the number of students they enroll (Chimombo et. al., 2014).

Private secondary schools, owned by private entrepreneurs can be categorised by the level of fees they charge. The low-fee paying schools are described as 'dwelling house schools' established in or adjacent to proprietors' homes. They tend to be small, have unstable enrolments, have most of their teachers on informal contracts and have very limited resources (Chimombo et al 2014). Their numbers have reduced drastically following a crackdown in 2009. A study of private secondary schools found that although private schools play an important role by supplementing government efforts to provide secondary education, they are very unevenly distributed geographically, with the majority serving the educational needs of the richest households in Malawi (Chimombo et al 2014). The lowest fee private secondary schools remain unaffordable for the poorest households and have their enrolments declining. The governance of private schools varies greatly, with most of these schools accountable only to their owners. Teaching staff are often poorly qualified, staff turnover is high, and many are on informal employment contracts. Learning materials and furniture in most of these low fee private schools do not meet minimum standards (Chimombo et al 2014).

Table 2.1 below shows the different types and ownership of secondary schools in Malawi.

Table 1.1. Typology of secondary schools in Malawi

School Type		CSS	CDSS	Grant Aided	International private	Established Private	Mission Private	Dwelling House
Funding	State	✓	✓	✓				
	Non-state	✓	✓	✓	✓	✓	✓	✓
Ownership	State	✓	✓					
	Non-state			✓	✓	✓	✓	✓
Regulation	State	✓	✓	✓		✓	✓	✓
	Non-state				✓	✓	✓	✓

The 2018 NESP-ESIP Review report produced a typology of categorization of secondary schools in Malawi (Table 2.2 below). It reveals the sharp differences in the types of secondary schools in Malawi and the implications for improving quality across the different provisions.

Table 2.2. Defining Characteristics of Secondary Schools in Malawi

Type	Defining characteristics
National	• Fully government owned, funded and run schools; • Top scoring students selected there. Enroll best students from across the nation; • Known for producing best grades at MSCE; • All students are boarders; • Best equipped with teaching and learning materials, laboratories and libraries; • Well-trained and experienced teachers; • 4 such schools; 0.2% of all secondary schools; • GPI = .7; Have PTAs.
Grant-aided	• Owned by religious organizations; • Government selects 60% of the students and remaining 40% by the proprietor; • Majority of teachers paid by government; • Proprietor decides on and retains fees; • Tax free; • All have boarding facilities; • Well- equipped with teaching and learning materials, laboratories and libraries; • Well trained and experienced teachers; • 2.3% of all secondary school students; • 21 such schools; 1.3% of all secondary schools; Have PTAs.
District boarding	• Carries the name of the District; • Enrolls students from within the district; • Fully funded by government; • Fairly good teaching and learning materials; • Boarding facilities; • Enroll 100:50, boys-girls; • 45 such schools; 2.7% of all secondary schools; • 1.3% of all secondary school students; Have PTAs.
City Day	• Located in cities; • Enroll students from within the city catchment area; • Fully funded by government; • Fairly good teaching and learning materials; • Enroll 50:50, boys-girls; • 1% of all secondary school students; • 13 such schools; 0.8% of all secondary schools; Have PTAs.
District Day	• Enroll students from within the district catchment area; • Fully funded by government; • Fairly good teaching and learning materials; • Enroll 50:50, boys-girls; • 48 such schools; 2.9% of all secondary schools; Have PTAs.
Community Day	• There are approved and non-approved schools. • *Approved*:

	-May have or may not have boarding facilities; -Receive direct funding from government; - Some have good structures built by DPs. • *Non-approved*: - Poor structures; - Unqualified teachers; - Inadequate Government funding through the divisions. • All have SMCs; • Overall, there are 703 such schools; 42% of all secondary schools; Have PTAs.
Open (OSS)	• A form of distance education under the authority of MCDE; • Make use of facilities & teachers of other schools, but operate outside of their class hours; a form of double-shifting; • Fee paying; fees finance teachers & school maintenance; • 428 such schools; 25.6% of secondary schools; • 10.4% of all secondary school students; GPI = 0.84.
Private	• A very mixed bag that goes from the best to the worst; • Include boarding & non-boarding schools; • 411 such schools; 24.6% of all secondary schools; 19.2% of enrolment.

Source: 2018 NESP-ESIP 2

3. Design of the research

3.1. Research questions

The research was designed to answer the following questions:

1. What are the key determinants of efficiency of secondary schools in Malawi?
2. How does school level efficiency vary across different types of secondary schools?
3. Which group of school factors (e.g., school management, professional development, education approaches, etc.), are associated with efficiency?
4. How does cost per student vary by school type?
5. How does the quality of teachers, student-teacher ratios, basic infrastructure and technology impact on learning outcomes?
6. How does teaching staff to student ratio; teaching staff to non-teaching staff and utilisation of resources and teaching space compare across schools?
7. How does management and governance of secondary schools' impact on their efficiency and effectiveness?

Based on insights from the research we address three further questions on the implications of the findings

- What are the opportunities to increase the efficiency of secondary schools in Malawi?
- What actionable local solutions can be generated and implemented to improve the efficiency of schools in Malawi?
- What are the incentives that would motivate stakeholders to value efficiency in each country?

3.2. Design process

The research was carried out in two stages. First, we carried out a survey of different types of secondary schools to develop an understanding of the key factors that determine school efficiency and quality. From the analysis of the large-scale survey, we purposively selected eight (8) secondary schools for in-depth qualitative analysis. The survey produced data for estimating school efficiency for different types or sizes of secondary schools. Our main output measure was final examination grades from which we obtained a school's pass rates and pass rates with distinction. For an estimation of inputs, we used the following data: teacher numbers, student-teacher ratio, class sizes, teacher quality (qualified/unqualified), and other infrastructure and material resources in schools (see Appendix 1). The questionnaire had 52 questions (and several sub options). It was not possible to include the capabilities of students on entry as an input measure. This is a limitation as some secondary school have selective entry policies that would subsequently affect examination performance.

We decided to use a specially designed Application (APP) pre-loaded on tablets for country research teams to use to administer the survey questionnaire. Data was loaded on to a server which the Sussex team accessed for analysis (Figure 3.1). We had two types of data sent for analysis through the server: (i) one capturing information on the array of school background characteristics linked to efficiency (with the school as the unit of observation), (ii) a unique dataset for each school on teacher qualification, experience, and salary (here the unit of observations is the teacher within the given school).[1]

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[1] This second dataset (which was merged to the main school dataset) is captured by question 20. For details, see Appendix 2 which includes an exemplary questionnaire.

Figure 3.1. Data collection and analysis
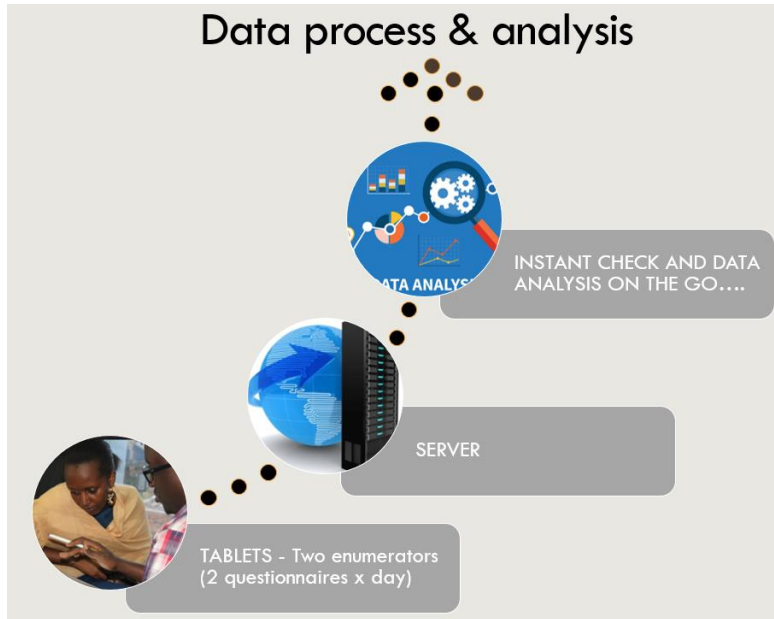
3.3. Sampling

Samples for the analysis are based on 88 secondary schools in Malawi. All indicators are secondary school indicators for form 1 to form 4 or Grade 9 to Grade 12). Overall, we over-sampled the most disadvantaged schools as we were interested in measuring school efficiency more accurately for the schools types most likely to expand to meet increased demand for universal access.

In Malawi we oversampled the most disadvantage schools. These are the conventional or community day secondary schools (CDSS) (we collected information on 46 out of the total sample of 88 schools, a 52% of the total sample). Within this group most of the schools sampled were from rural areas (=31), which represents 57.4% of the total rural sample (Figure 3.2). Also, within the rural areas we sampled a proportion of private schools (27.8%). We focused on the low-fee paying private schools, the most disadvantaged private schools (rather than those located in urban areas). We sampled 22 schools (a 25% of the total sample) representing 47.1% of total urban schools.

Figure 3.2. Malawi school sample distribution (percentage by location)
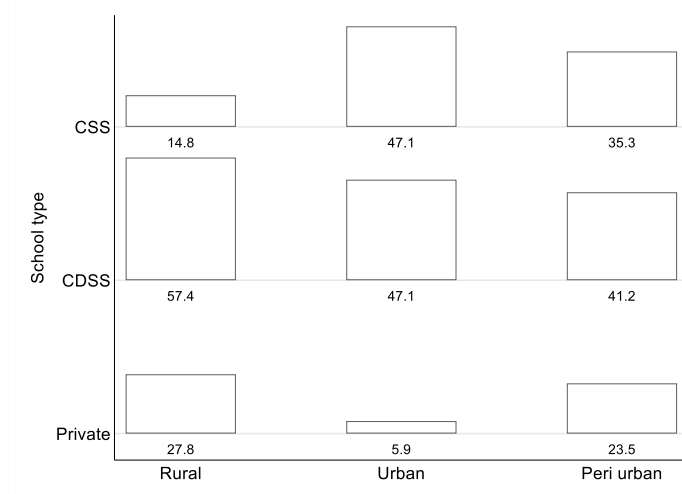
4. Defining School Efficiency and Framework

Determining how efficient education can be provided has been a challenge for both researchers and policy makers. Schools can be seen as organisations which produce a mix of outputs from various inputs. We would expect that efficient use of resources would lead to outputs at the lowest level of resources. In addition we would expect that effective use of resources will ensure a mix of outcomes desired by parents and society.

In this study we have defined and applied school efficiency in three ways.

1. First, efficient schools produce good learning outcomes, measured in terms of examination results with key inputs. This definition makes it easy to quantify efficiency because examination results are a measurable entity. In our case, we were interested in understanding the relationship between inputs (e.g., student teacher ratio, number of computers per students and per teacher and school infrastructure) and outputs (examination pass rates), hence mimicking a production function. This is referred to in the literature as *technical efficiency* and describes the transformation of a mix of inputs into desirable learning outcomes.

2. Second, efficient schools manage their human and financial resources well. This definition focuses on the internal management of schools. We drew on case studies of selected schools for insights into the challenges schools face in accessing and managing their resources efficiently. Schools make choices (or choices are made for them by de facto) on what purchases or inputs to prioritize, who to recruit or sometimes simply accept teachers assigned to them from national or district authorities, irrespective of their competence. When there is a funding gap, schools may have to appeal to parents to fill this gap, others may decide, in the face of limited finances, to restructure, e.g., combine classes or deploy resources away from activities that can impact on the quality of teaching and learning. All of these decisions have direct consequences on school efficiency and outcomes.

3. Third, efficient schools can be defined as schools which produce good results (e.g. examination results) for all students at costs that are affordable and sustainable. We were interested in whether secondary schools in Uganda can achieve the same learning outcomes for all students at lower costs or, whether some types of secondary schools are able to achieve higher learning outcomes at relatively lower costs.

These definitions suggest a focus on *outcomes, internal management, costs and equity* in an analysis of school efficiency.

Closely related to the concept of technical and cost efficiency is the idea of student flows through the grades. Lower flows, for example, caused by repetition or selection policy could be an indication of inefficiency in progressing all students through to successful completion. This is also an equity issue − do schools select students from backgrounds that maximises their chances of achieving good examination results and successful completion? In more selective schools, technical efficiency would be higher if higher student learning outcomes are driven by the higher socio-economic background of students. Thus, we were interested in whether more efficient schools are also more likely to operate selection policy where only the most able progress to the end of the secondary cycle to take the final exams, and the least able either dropout or repeat their grade.

A summary of the different aspects of efficiency is shown in Figure 4.1. The intersection between technical efficiency (TE) and cost efficiency (CE) shows schools that are able to maximise outputs for a given set of inputs, and at affordable costs. Schools which lie outside both TE and CE circles are highly inefficient. Schools can be technically efficient but achieve this at high costs, or they may be CE but not TE.

Figure 4.1. Technical and cost efficiency and equity
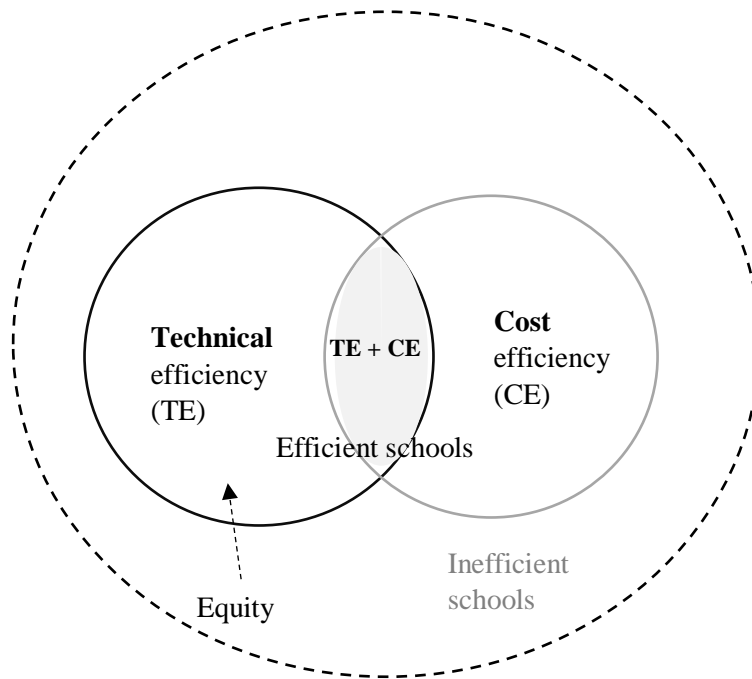
From the survey data we used a benchmark of technical efficiency based on an aggregation of inputs across all the schools in each country to construct an ideal model of schools of different sizes which we then compared with actual schools. The benchmark of technical efficiency is an index showing efficient schools that are able to maximise educational outputs. Where different schools lie in relation to this benchmark is then used to assess their level of technical efficiency. Examination passes and passes with distinction are used as proxy measures of learning outcomes. Finally, we applied Data Envelopment Analysis (DEA), a statiscal technique to distinguish between efficient and inefficient schools. For details of the technique, see Appendix 1.

5. School Efficiency in Malawi

5.1. Summary Statistics

The sections below contain Malawi's empirical findings. Across these sections, the emphasis is on key differences by school type and location, and by estimated efficiency and characteristics of the top-efficient and low-efficient Malawian's schools.[2]

5.1.1. Schools' background characteristics

Tables 5.1 and 5.2 has information on the Malawi sample. Out of the 88 schools sampled, 46 (52%) are CDSS schools (Table 5.1), and 54 schools are from rural areas (which represents a 61% of the total sample -Table 5.2). Combining school type and location, most of the schools sampled are rural CDSS (35%) and rural private schools (17%).

Table 5.1. Distribution of school sampled by type (Malawi)

school type	Number of schools	Percentage
CSS	22	25
CDSS	46	52.27
Private	20	22.73

Table 5.2. Distribution of schools by school type and location (Malawi)

School type	Rural	Urban	Peri urban
CSS	8	8	6
CDSS	31	8	7
Private	15	1	4
Total	54	17	17

Notes: (1) Rural schools are from rural areas; urban schools are from town and cities; peri-urban schools are from small town are peri-urban areas.

Table 5.3 shows that students from CSS schools live near their schools although most of these schools are boarding schools, whereas about 60% of students from Community Day Secondary Schools (CDSS) live more than 3 kms from schools. Nearly a third of private school students also live more than 3 kms away from their schools (32.9%). CDSS serve a more dispersed demand from rural areas, and perhaps explains why a sizeable proportion walk more than 3 km to reach their school.

Table 5.3. Distance from schools (Malawi)

	Average distance from residence to school			Proportion of students walking more than 3 km
	0-1 km	1-3 km	more than 3 km	
CSS	83.5	7.5	9.0	4.7
CDSS	17.2	22.8	58.5	44.1
Private	58.2	9.0	32.9	27.1
Total	43.1	15.8	40.2	29.7

CSS enrol more students than other schools (Table 5.4), CDSS tend to be smaller schools. Urban schools enrol twice as many students as schools in rural areas. Peri urban schools are of medium size.

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[2] Recall that the summary statistics' sub-sections follow the structure of the five parts of the questionnaire (see Appendix 2).

Table 5.4. Mean school enrolment by type and location (Malawi)

	Mean	Standard deviation
School type		
CSS	568	364
CDSS	350	208
Private	404	229
School location		
Rural	328	164
Urban	672	388
Peri urban	444	257

5.1.2. School Practices

Offering remedial classes for underperforming students in private and CSS schools raises pass rates by 15% and 9%, respectively, but not in the case of CDSS (Figure 5.1, first plot). The bigger impact of remedial classes is also correlated with repetitions – a widespread phenomenon in the last grade of private schools. There appears to be a relationship between grouping students according to their performance and the distinctions a school achieves, but only for CSS and CDSS schools. Ability grouping in private schools appears to be related to lower pass rates with distinction, which suggests that it does not make a difference to performance. (Figure 5.1, second plot). Pass rates with distinctions increase hugely by 55% in CSS and double from 10% to 21% in CDSS.

Figure 5.1. Remedial classes, ability grouping and passing rates (Malawi)
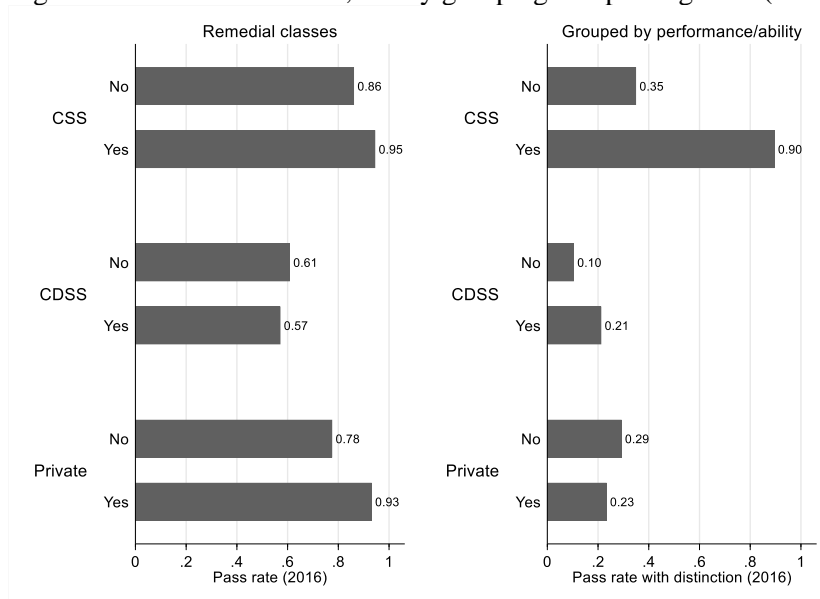
5.1.3. School Finances

All schools rely on additional income (representing on average about 81% of total funding). Government school teachers receive salaries from central funds. Private schools receive almost all their income from fees (about 95%). In CDSS and CSS fees income are nearly 77% and 79% respectively (Table 5.5). This has implications on financial planning since about 20% of total income for these two types of government schools are from an unstable source (school charges and PTA contributions). Since over 80% of students from disadvantaged backgrounds (Table 5.6), relying on fees and income from resource-constrained households is likely to put constraints on the ability of schools to run efficiently.

Table 5.5. Source of funding by school type (Malawi)

school type	School funding		
	school fees	other charges	PTA contributions
CSS	78.8	14.9	6.3
CDSS	76.5	10.0	12.9
Private	94.7	2.2	3.0
Total	81.1	9.5	9.0

Notes: (1) A t-tests for the portion of non-fess funding comparing CSS and CDSS against private schools is statistically significant (p-value =0.004). For CSS and CDSS means for this non-fee funding are equal (p-value = 0.794).

Table 5.6. Proportion of socioeconomically disadvantaged students by school type (Malawi)

degree of disadvantage		CSS	CDSS	Private	Total
low	n	4	6	5	15
	%	18.18	13.04	25	17.05
medium	n	12	18	11	41
	%	54.55	39.13	55	46.59
high	n	6	22	4	32
	%	27.27	47.83	20	36.36

Notes: (1) The degree of disadvantage is measured by the proportion of students who comes from socioeconomic disadvantaged homes. (2) The degree of disadvantaged is low if between 1-33% comes from socioeconomic disadvantaged homes, medium if the proportion is between 34%-66% and high if it is above 66%.

We explored the impact of school finances through case studies of eight (8) secondary schools. The data revealed variations across the case study schools. Overall and unsurprisingly, CSSs are relatively well resourced in terms of human resource, finance and infrastructure. This was more evident at Oyera CSS where, unlike other schools, which pay a proportion of school fees into a special government account, Oyera uses all its fee income to pay bills, provide monetary incentives to teachers and purchase additional learning materials. At the start of the 2017/18 academic year, the school had spent about $9000 to purchase textbooks to meet the requirements of a new curriculum. According to the head teacher, some community day secondary schools borrow materials from their school.

Table 5.7 shows that the two CSSs, Oyera and Buluzi, generate more income than other schools through hiring their facilities and premises during school holiday breaks. This was not the case in nearly all the other CDSSs where hiring of premises fetched a small income. Based on estimates provided by the case study schools, school fees at Oyera CSS comes to about $390 per student per year. The school makes an extra $20,000- $27,000 a year by hiring its premises to the national examinations board to organise national examinations. This has become a regular source of extra income.

Buluzi CSS also generates additional income to pay its teachers teaching allowance and to buy textbooks. Students pay about $200 a year as fees and the school is able to generate an additional $6900 each term from hiring its premises to a privat company. With a student population of 700, its fee income is about $140,000 a year. In contrast, students in rural Zaone CSS pay about $23 a year as school fees earning the school about $5,267 from an enrolment of 229 students. Its other source of income is from hiring out classrooms for events organised by local communities and which earns the school $750 a year. These cases indicates the level of financial inequity across different types of schools and shows that schools in rural areas may be particularly disadvantaged.

Community Day Secondary Schools (CDSS) have some of the lowest resources. Ndaona CDSS is secondary school with a student population of 210 charging about $23 school fees per student per year. The school earns on average $7 for every classroom it rents out for local community activities.

Table 5.7. Case study schools' school fees, enrollment and other sources of income (Malawi)

	Oyera CSS	Buluzi CSS	Zaone CSS	Nsonga CDSS	Moni CDSS	Ndaona CDSS	Makhi Private	Njinga Private
Fees/Term	K95,000 $130	K50,000 $70	K5,000 $7	K7,500 $10	K6,000 $8	K5,750 $8	K125,000 $172	K35,000 $50-Day K135,000 $175 Boarder
Day/Board	Boarding	Boarding	Day	Day	Boarding	Day	Boarding	Both
Fees/Year	$390	$210	$21	$30	$24	$21	$516	Day - $150 Boarding - $525
Enrollment	529	700	239	304	318	210	619	570
Internally generated funds	-PTA contributes K10,000 ($14)/term	PTA Contributes K5000 ($7)/term						
	K15m-K20m/year from hiring school premises	K4.5m/year from hiring school premises -School hall hired at K30,000 for weddings and other community activities	Classrooms hired by the community	Classrooms hired out to churches, clinics for under 5 etc.	Premises not hired	Classrooms hired by communities at K5,000 per event	Premises not hired	Premises not hired
Income distribution	Fees: 85% Other:10% Donations: 5%	Fees: 71% Other:25% Donations: 4%	Fees: 85% Other:10% Donations: 5%	Fees: 75% Other:10% Donations: 15%	Fees: 69% Other:10% Donations: 21%	Fees: 90% Other:10%	Fees: 100%	Fees: 100%

Out of the low fees income these schools make some of it is transferred into a general purpose government account at the district or into a school development fund. For example, students at Zaone CDSS – a day school, pay $21 school fees per year, from which 69 cents is transferred into a general purpose government account, and $5.5 into a school development fund. Students pay an extra 34 cents into a textbook revolving fund each year. Similarly, students at Nsonga, Moni and Ndaona contribute about 34 cents towards a textbook revolving fund, and 69 cents per student is transferred into a government account; another 69 cents per student towards a general purpose fund, and about $5 is paid into a school development fund. This is highly regressive financing of secondary education, but also shows that household are making a significant contribution to secondary education, even in schools which charge low fees. As table 5.7 shows only Oyera and Buluzi (both CSSs) are able to generate additional income from PTA contributions. Private schools rely solely on fees income which are much higher than fees charged in government CSS and CDSS schools. The three case study CDSSs complained that the fee income was insufficient for running their schools, leaving very little to invest in teaching and learning. As one school bursar explained:

> From the little fees we receive, we must also buy small school items like brooms, sports attire, sanitation equipment. We pay hired labor like security guard, assistant librarian. We don't have enough funds, we have problem procuring teaching materials. Even the teachers are failing to have flip charts, seal tape for teaching.

Generally, CDSS are cash-strapped. From the $70 students pay each year at Buluzi CSS, about 34 cents of this amount is paid into a government account. The bulk is used to feed students (about $54 per student – amounting to 75%. About $14.50 is spent on maintenance, cleaning and purchasing learning materials. Households also contribute about $7 per year for the construction of a girls' hostel. Even with all the extra expenditure, Buluzi has more to spend than the other CDSSs.

There are also differences in the funds allocated to schools from government. Teacher salaries are paid by government for both CSS and CDSS. As noted, much of the funding is used to feed students and boarding schools get much more than day schools. CSSs located in urban areas are allocated more resources than CDSSs and rural-based CSS. For example, Oyera (boarding school) receives a monthly capitation grant of $746. At the beginning of 2017/18 academic year, it had spent about $9000 to procure textbooks for the recently introduced curriculum. Buluzi CSS receives a yearly grant of $41,469 out of which $1,383 is used to buy textbooks. On the other hand, Ndaona CDSS receives a monthly capitation grant of $170 earning it $2,040. Moni CDSS receives $172 earning it an income of $2,064 which according to the headteacher rarely arrives on time.

In effect, CDSSs have to operate on a much tighter budget than CSS. In situations where fee income and government subvention does not arrive on time, this puts additional constraints on the ability of schools to provide quality secondary education. Some schools may divert resources meant for instructional intputs into feeding or paying teacher bonuses. Although, Makhi, a low-medium cost private school, had more control over its finances, the deputy head teacher explained that once school fees are collected, it is deposited into an investment bank to accrue interest, some of which is then used to offer scholarships to needy students. The school is also able to pay its teachers on time. Njinga, another low-medium cost private school with similar student population and fee structure struggles to attract and retain qualified teachers and has poor infrastructure.

Parents and Teacher' Associations (PTA) proved vital in all schools, regardless of whether the school had a board of governors or not. All schools apart from Oyera CSS and Makhi private school did not have a board of governors. For those schools without governing boards, PTAs played an important role by working closely with the schools' management team. Often, the PTA committee provided checks and balances in how funds were spent, monitor teachers and students' performances and help with school development work. Parents were often asked to contribute money each term towards development projects or into a fund to pay bonuses to teachers as an incentive. At urban-based schools, the PTAs made more financial contribution than schools in rural areas. This was more evident at Oyera CSS where each member of the PTA contributes about $14 per term. As of January 2018, the PTA had made contribution of about $10,000 some of which had been used to construct a library, provide a computer laboratory, and provide 100 chairs and 12 tables. The PTA had also bought lamps for students and were planning to install solar panels by mid-2018. Similarly, at Buluzi CSS the PTA had made contributions towards building a girls' hostel to improve access.

CDSSs, such as Nsonga also had similar practices; although the PTA's monetary contribution is small, about $3 per parent per term. At Moni CDSS, the PTA had made a decision to levy parents about $8 per term to support development projects, teacher welfare and awards for top performing students. The PTA was also engaged in in other income generating activities such as farming and small-scale business to support school activities.

The case study evidence on PTA contributions to school finances is another indication of how inadequate funds for secondary schools can put pressure on PTAs to fill in the gaps and which makes the schools even more inequitable in terms of resources and their capacity to provide quality secondary education.

5.1.4. Access, participation and grade transition

Average dropout rates across secondary grades 9 to 12 are displayed in Figure 5.2 by school type and location. The highest dropout is in CDSS (9.6%). Dropout is relatively low in CSS (2.9%) (Figure 5.2

first panel). Students who attend rural schools seem more likely to drop out (more than three times as high as those attending urban schools). CSS have the highest enrolment and lowest dropout rate. Urban schools have the lowest dropout rate and highest enrolment (Figure 5.2, second panel). Across grades, dropout rates increase for both CSS and CDSS, are stable in private schools but noticeably drop in grade 12 (Figure 5.3). Repitition and dropout may be a factor as students progress towards the final examinations. The low dropout rate in private schools could be due to cumulative repetition in the last grade to increase chances of passing the final exams.

Figure 5.2. Average dropout rate by school type and location (Grades 9-12) (Malawi)
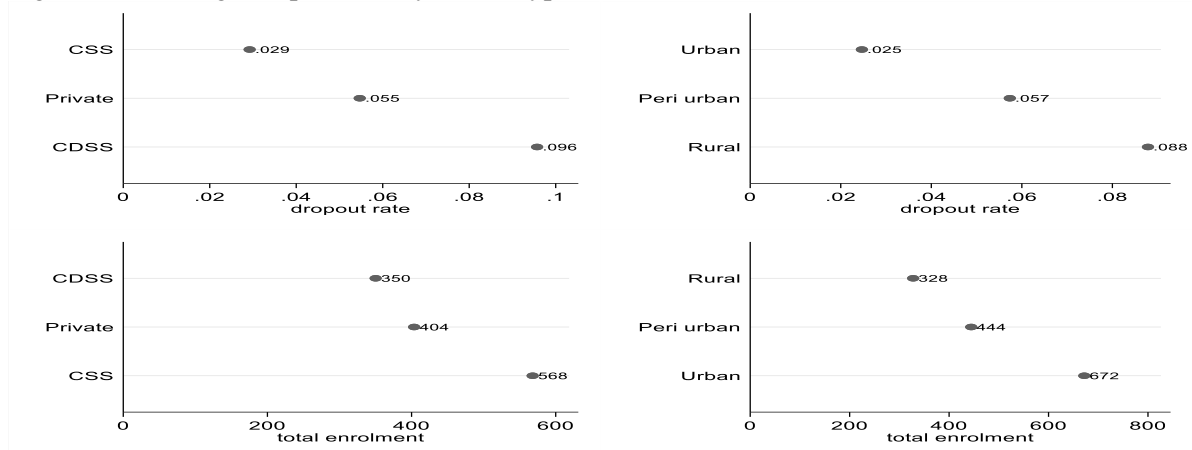
Notes: (1) Dropout rates are the average dropout across the secondary school cycle over the total enrolment (across grades 9 to grade 12).

Figure 5.3. Average dropout rate by grade by school type (Malawi)
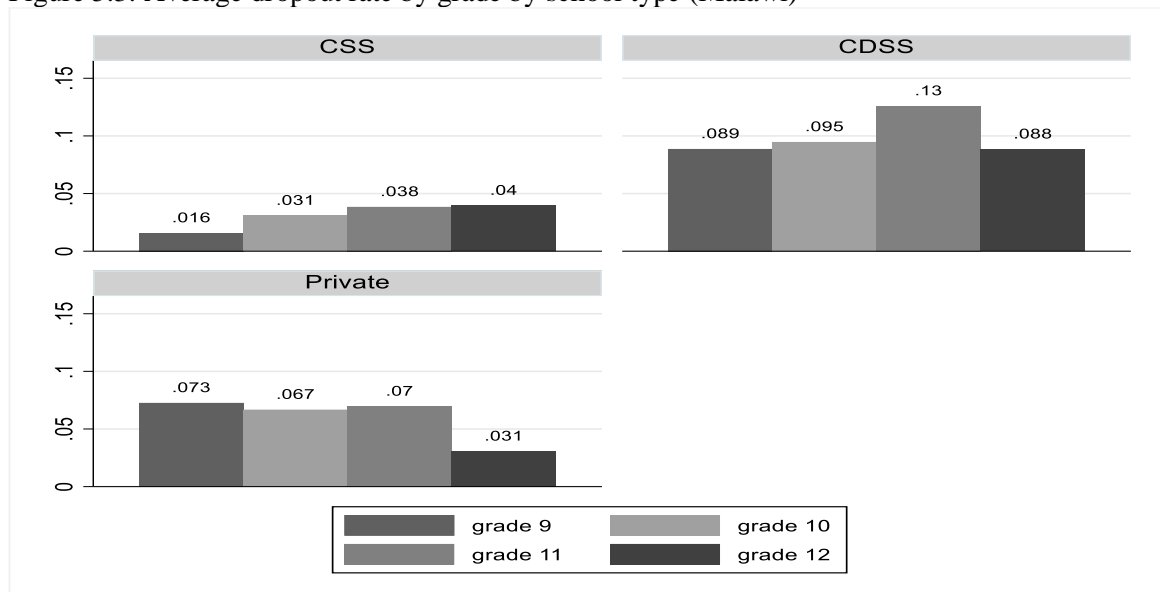
Notes: (1) Dropout rates per grade are obtained as the ratio of dropout for the specific grade divided by the total enrolment for the specific grade

We explored selection and repetition by comparing consecutive grade enrolment. Figure 5.4 displays the degree of selection and repetition, obtained by dividing the enrolment between consecutive grades (grade x+1 / grade x). Lower ratios indicate stronger selection and a ratio above one either suggests an influx of students from other schools or higher repetition (in grade x+1). Figure 5.4 shows that selection across grades is rather low and moderate at the beginning of secondary education – e.g. enrolment at grade 10 for CSS is 12% lower than at grade 9. In CDSS it reaches its peak a grade later (ratio of enrolment between grade 11 and grade 10 is 0.79). In private schools, however, all ratio across grades is greater than one, thus indicating that grade repetition is a common practice. In the last grade, just

before the secondary school leaving exam, the ratio of enrolments in grade 12 and grade 11 is 1.70 for private schools which is highly indicative of private schools repeating students to improve their learning, before taking the final examinations. Repitition has cost implications for parents and since most private schools are serving disadvantaged households this would be an additional cost burden.

Figure 5.4. Selection across secondary school grades (Malawi)
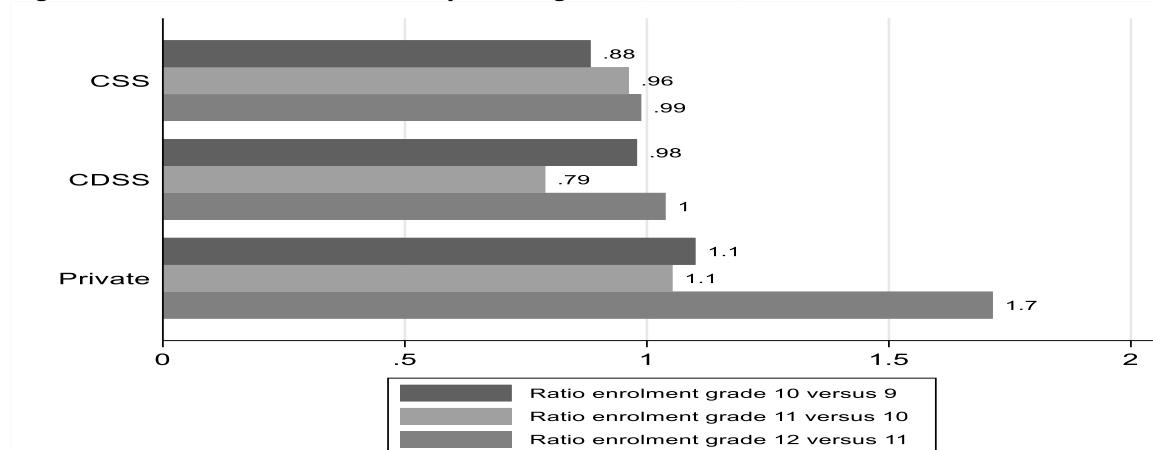
5.1.5. *Teachers – qualification, utilisation, turnover and professional development*

Qualification and utilisation

The professional status of teachers is important for understanding the quality of teachers. In addition, how teachers are utilised is an important efficiency issue that impacts learning outcomes. Large class size affects the quality of learning so the choices schools make in how many students a teacher teachers becomes an important efficiency issue, especially if better organisation of teaching can reduce class teacher ratio.

Generally, secondary schools are staffed by qualified teachers. Community day secondary schools and private schools have the least number of qualified teachers (Table 5.8). Private schools employ more support staff than teachers - highest ratio of support staff to teachers (57%). Community day secondary schools have the lowest number of support staff and CSS fall between community day secondary schools and private schools. CSS have the largest number of qualified teachers – nearly twice as many as community day and private schools. Student teacher ratios are similar across school type (between 31 and 38). Urban schools have significantly more students per teacher (=45.9) - an STR which is 63% higher than in rural schools (=28.2) (Figure 5.5). Peri-urban schools also have low STR compared to urban schools. Higher STR can adversely impact technical efficiency due to the impact on effective teaching and learning.

Table 5.8. Average number of teachers across school types (Malawi)

School type	qualified teachers	unqualified teachers	professional support staff	other support staff	% professional support staff for teachers	Ratio unqualified versus qualified teachers	School size
CSS	20.9	0.6	4.8	12.3	22%	0.030	568
CDSS	11.3	0.2	1.3	1.9	11%	0.017	350
Private	11.3	0.2	6.5	13.2	57%	0.020	404

Figure 5.5. Student teacher ratio (STR) (Malawi)
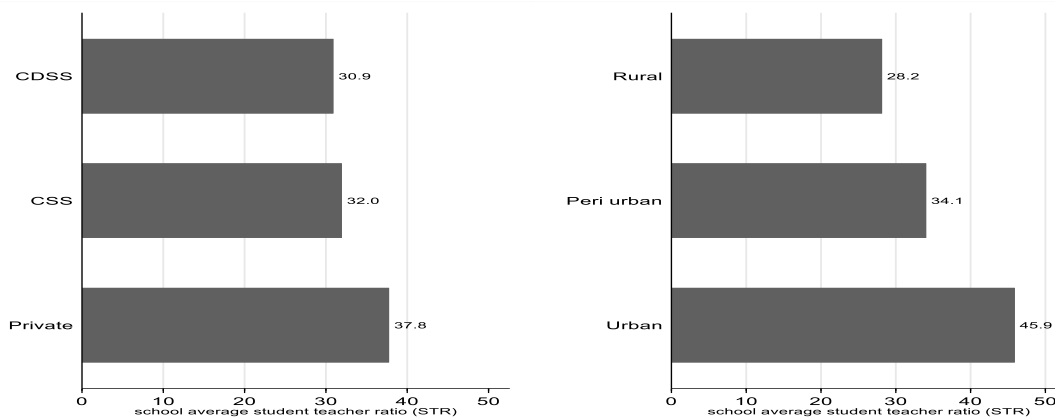
All eight case study schools complained about teacher shortage and workload and the effect this was having on instructional quality. It was used to justify the need to pay bonuses to teachers in order to keep them motivated. We explored the claim of heavy workload in the eight case study schools. Table 5.9 presents the resuls.

First, secondary school enrolments are low. This increases the output to input cost ratios in secondary schools in Malawi. Second, as noted in the survey results, most schools employ qualified teachers. Ndaona CDSS is an exception employing 41% unqualified teachers. At Zaone CSS (in a rural area) five out of the nine teachers are qualified. The other four teachers are only qualified to teach at primary school level. Not all the teachers at Njinga private work full time - four teachers also teach part-time in nearby schools and has the highest student teacher ratio among the eight schools. Notably all schools have large class size with teaching periods ranging between 24 and 38.

The ratio of teachers to classes suggest that teacher workload may not be as high as schools claim. In most cases, as table 5.9 shows, at least one teacher is not teaching when another is. This is worse in community day secondary schools. For example at Nsonga CDSS, for every teacher who is teaching at a specific time four are not engaged in classroom teaching.. At Moni CDSS, when one teacher is teaching three are not. It raises questions about efficient utilisation of teachers and whether more can be done to reduce this gap - maximising workload by reducing the number of teachers and increasing teaching periods for some teachers. Student teacher ratios are generally low in the case study schools, except Njinga private school. But, class sizes are relatively large and coud be the reason why teacher utilisation is low.

However, because secondary school teaching is subject-specific, it is possible that some teachers may be doing more teaching than others, for example science and mathematics teachers. Part of the problem is also the ability to recruit science and maths teachers in rural schools. At Moni CDSS the headteacher explained the challenge: *"As a head teacher at this school, I also teach Math, Biology, Chemistry, Agriculture, and Physics in Forms 1,2, and 3. I teach 26 lessons per week in addition to my leadership duties. We now have to teach physics and chemistry separately"* In this particular case, combining teaching and management duties has consequences on the headteachers ability to provide adequate support all teachers in the school.

Space constraints could also be a factor in why average class size is high for most schools. At Moni CDSS, the head teacher gave this as the main reason for the large class size – not having enough classrooms to reduce the size of the classes

Table 5.9. Teacher utilisation in case study schools

	Oyera CSS	Buluzi CSS	Zaone CSS	Nsonga CDSS	Moni CDSS	Ndaona CDSS	Makhi Private	Njinga Private
Enrolment	529	700	239	304	318	210	619	570
# Teachers	36	33	9	19	15	12	23	11
# of Qualified Teachers	32	32	5	16	15	5	21	8
# of Male Teachers	20	14	8	15	8	12	16	10
# of Female Teachers	16	19	1	1	7	0	7	1
# of Part-time teachers	0	0	0	0	0	0	0	4
Student Teacher Ratio	16	21	27	16	21	18	27	52
Av. Class Size	45	43	58	76	80	55	65	94
Av. teaching periods /week	24	24	38	26	28	32	32	30
# of Teaching Groups[1]	18	16	4	4	4	4	9	6
# of lessons to be taught[2]	432	384	152	104	112	132	288	180
# of lessons available per teacher[3]	12	12	17	5	7	11	12	16
Ratio of Teachers to Classes [4]	2	2	2	5	4	3	2	2

Notes (1) Number of students divided by the class size. (2) Number of teaching groups multiplied by the number of teaching periods per week (3) Number of lessons to be taught divided by the number of teachers (4) Number of teachers divided by teaching group.

Teacher Turnover

We calculated teacher turnover for the current year - the number of appointed teachers plus teachers who had left as a proportion of the total current teaching force, by school type and location (Figure 5.6). Turnover can have either positive or negative effects. New arrivals take time to adjust and teachers who leave take their experience to other schools, which may be good for those schools, but bad for schools losing them especially if they are not replaced immediately. In situations where schools have more more teachers than they actually need this would lead to inefficiencies in teacher utilisation

Turnover is generally very low – around 1.5%. Secondary School teachers in Malawi hardly move to other schools or leave the profession. Private schools and schools located in peri-urban areas have a turnover of about 3%. Low teacher turnover is important for technical efficiency as students then benefit from long-serving teachers with more teaching experience.

Figure 5.6. Teacher turnover for the current year (Malawi)
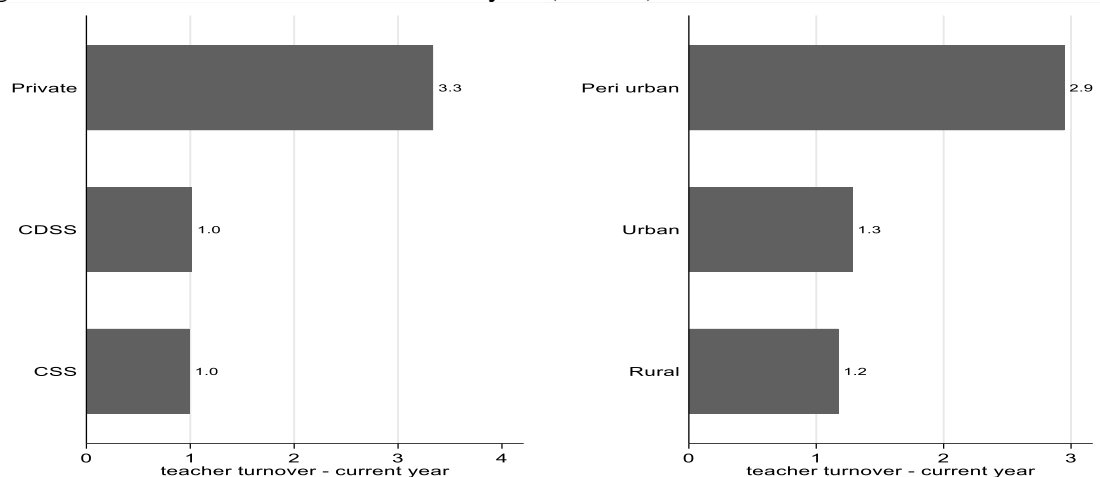
Professional development

Private schools are more likely to have a budget for organising professional development activities than other schools. (Table 5.10). However, in terms of time for teachers to actually go on professional development courses CSS do a little better. Overall, staff development activities are low across school type. Less than half the number of schools provide information on professional development activities at the district level.

Table 5.10. Teacher professional development (PD) support by school type – policies (Malawi)

school type	separate budget	provides time to go on prof dev courses	organises staff development activities	circulates information on prof dev courses in the district
CSS	32%	45%	5%	36%
CDSS	50%	41%	4%	48%
Private	65%	35%	15%	50%
Total	49%	41%	7%	45%

Subject-specific professional development activities is also quite low – schools indicated that only one in three schools have teachers who have had subject-specific professional development–(Table 5.11). Private school teachers are slightly more likely to have attended professional development courses or workshops, but are marginally less likely to have undertaken observational visits and prepared lesson plans (Table 5.11) – both of which are important ingredients for improving the quality of teaching in schools. It appears that schools place more emphasis on instructional collaboration, mentoring and peer observation, although of the three types of schools, CDSS do less of this (57%).

Table 5.11. Teacher participation in professional development, last year (Malawi)

school type	courses or workshops on subject and to discuss ideas/problems	collaboration on instruction and mentoring, peer observation	observational visits, networks
CSS	32%	68%	73%
CDSS	35%	57%	83%
Private	40%	70%	75%
Total	35%	63%	78%

Head teacher experience

Experienced headteachers can use their vast knowledge and expertise to enhance school efficiency. Figure 5.7 shows that headteachers in private schools were the least experience and also had less experience in their current schools as a proportion of their total experience. Head teachers in urban schools had the least professional development in the last year compared to heads in rural areas This may reflect increasing incidence of in-service training targeting schools in disadvantaged regions mainly provided by local or international NGOs. Overall, about 57 percent of headteachers in the sample schools had participated in any kind of professional development (Table 5.12).

Figure 5.7. Years of headteacher experience (Malawi)
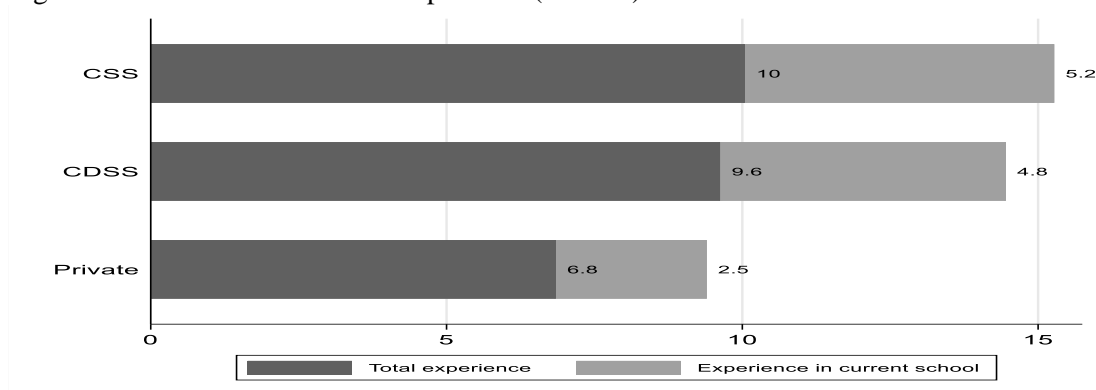
Table 5.12. Headteachers professional development – participation last year (Malawi)

School location	Percentage
Rural	63%
Urban	41%
Peri urban	53%
Total	57%

5.1.6. *Examination Preparation and Achievement*

How much time schools spend on examination preparation is a good indication of the effort that goes into preparing students to pass the final examinations. But, also spending more time on exam preparation means less time for classroom instruction and learning. Most schools spend about a fifth of teaching time preparing students for examinations. However, this is not correlated, at the aggregated level with high passing rates (i.e. distinctions) (Figure 5.8). CSS spend the most time preparing students for examinations and achieve the highest percentage of pass rates with distinction. CSS are also more likely to attract the best students and are better resourced as discussed earlier. Both private and community day secondary schools spend a similar proportion of time on examination preparation, but the former do better in achieving a higher proportion of students passing with distinction. Thus, CDSS spend about the same time as private schools preparing students for examinations, but for CDSS the quality output is low.

Spending more time on exam preparation may also be reflective of the quality of students who enrol in the different schools. In any discussion of school efficiency, it is important to relate this to instructional management issues such as time on teaching and time preparing students for exams

Figure 5.8. Time used for exam preparation and achievement (Malawi)
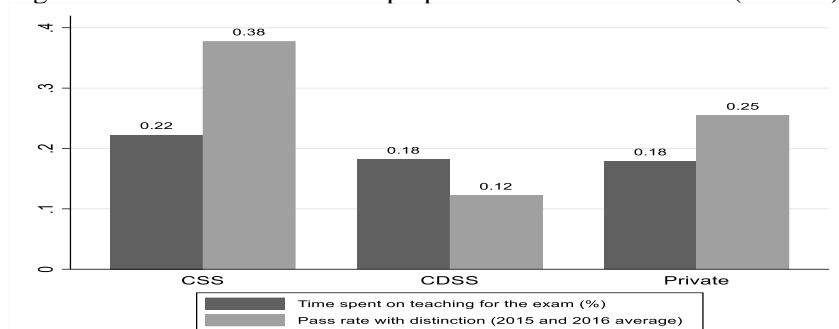
Notes: (1) Pass rates with distinction are calculated as an average for the years 2015 and 2016 for the exam at the end of secondary (grade 12).

5.1.7. *Computer to student and teacher ratio*

Technology use in secondary schools offers insight into how well secondary schools in Malawi are positioned to provide learning experiences that tap into wider knowledge and resources for learning. In the study, we used access to computers as a proxy measure to this potential. Table 5.13 shows very low availability of computers to students across schools (between 3.6 to 9.6 PCs across school types and 6.2 for all schools), as well as low access to web-connected PC for students (in general less than one). Low stock of PCs is also observed for teachers and management staff (for teachers 0.5-1.6 and for staff 0.5-2.4). When controlling for school size, PC student ratios vary between 0.009-0.019, that is, between 1 and 2 PC for 100 students. Within this environment of low IT infrastructure, students from CDSS are the most disadvantaged, followed by students in private schools. CSS have the highest PC student ratio, but even in these schools the rate is very low (0.019).

Table 5.13. Average number of PCs and PC student ratio (Malawi)

school type	Average number of PCs for students per school	Average number of PCs connected for student per school	Average number of PCs for teachers per school	Average number of PCs for management staff per school	PC student ratio
CSS	9.6	0.7	1.0	1.7	0.019
CDSS	3.6	0.2	0.5	0.5	0.009
Private	8.4	3.3	1.6	2.4	0.017
Total	6.2	1.0	0.9	1.2	0.013

5.1.8. *Autonomy and recruitment*

School autonomy is widely regarded as an important condition for the improvement of school practices. Schools with greater autonomy can adapt more quickly to changing educational circumstances and make decisions that can enhance the student learning experience. Private schools have more autonomy in terms of determining the time they allocate to subjects on the timetable but also in terms of determining how many teachers they need. As government schools, CSS and CDSS have far less autonomy in deciding how much time should be allocated for each subject. This would often be prescribed from the centre. They also have less freedom to decide how many teachers they need. Case study CDSS and CSS schools pointed out that they often had to wait for approval for teachers who have left to be replaced. This is partly because teachers were paid by the central government and therefore they could not make independent decisions on who they wanted to recruit and how many.

Not surprisingly, therefore, about 95% of private schools sampled make their own recruitment decisions, whereas for CSS and CDSS only about 20-32 percent feel they are in the position to recruit teachers they need (Table 5.14).

Table 5.14. Autonomy on teaching timetable and selection (Malawi)

school type	Determine the time allocated to subjects on the school timetable	Decide how many teachers the school needs
CSS	27%	32%
CDSS	22%	20%
Private	75%	95%
Total	35%	40%

5.1.9. Achievement

An important output measure for the analysis of efficiency is achievement. We use national examination data provided by the schools for insight into quality of learning outcomes. Pass rates are generally high which might suggest that it does not take much to pass or schools do a good job in teaching students effectively.

Table 5.15 shows that from 2013 to 2016, CSS achieved the highest pass rates. Pass rates are much lower in community day secondary schools (CDSS) - 20% lower than in CSS. A similar pattern can be seen in the case of distinctions. However, the gap across school types is much wider. For instance, whereas pass rates are 15 percent higher in CSS, in private schools distinctions triple – about 46%.[3]

Table 5.15. Pass rates and distinction rates (grade 12) (Malawi)

school type	Pass rate				Distinction			
	2013	2014	2015	2016	2013	2014	2015	2016
CSS	86.7%	83.3%	80.3%	89.2%	26.2%	27.5%	35.4%	37.8%
CDSS	52.3%	54.8%	58.1%	60.2%	14.3%	12.9%	12.5%	11.9%
Private	76.8%	81.4%	70.1%	79.2%	26.3%	28.1%	17.0%	27.1%
N	82	82	86	87	83	82	80	84

Notes: (1) Pass rates are for the exam at grade 12 (i.e., the end of the secondary school cycle). (2) Rates are calculated as the total number of students who passed (or obtained distinctions) over the total number of students who sat the exam.

Figure 5.9 shows the exam grades in more detail, disaggregated by *fail, pass, credit and distinctions*. CSS achieve the highest number of distinction grades (17%) and CDSS the least (4%). About a fifth of CDSS students fail (22%). Private school students obtain a similar rate of `good passes' (credit) as CSS schools. CDSS achieve the most low passes (grades 7 and 8). Overall, CSS achieve the best learning outcomes, followed by private schools and community day secondary schools. This is also consistent with the differences in resources between the different types of secondary schools. CSS are better resourced, provide education for students from advantaged backgrounds and spend more time preparing students for national examinations. Community day secondary schools consistently underperform compared to CSS and private secondary schools

Figure 5.9. Passing rates for exam at grade 12 (Malawi)

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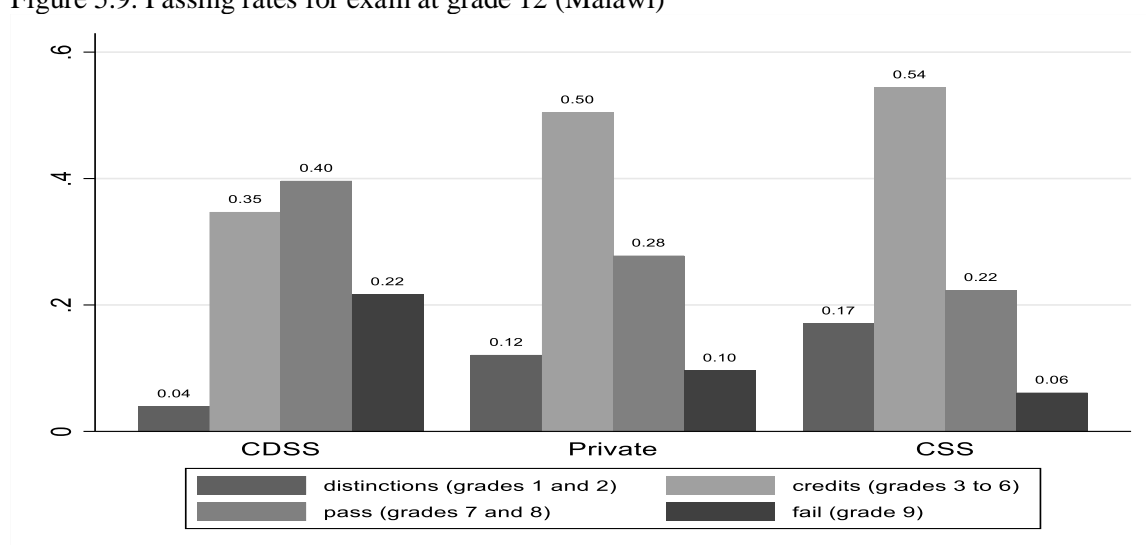
[3] Selection is low, at most 6% between those who were enrolled in the last grade and those who took the exam.

5.1.10. Cost

The largest unit cost per student occurs in CSS (=$213), followed by private schools (=$143) and CDSS (=$11) (see Table 5.16). Thus, CDSS provide the cheapest secondary education and also the poorest as earlier discussed. The unit cost per student in a CSS is about twenty times that for a student in a CDSS. However, CDSS spend three times as much on salaries as they do on other expenditure, partly because they are day schools with less infrastructure as the majority boarding CSS - about 86% of CSS in the study are boarding schools. CSS and private school, spend more on infrastructure (the ratio is 0.51 and 0.46 respectively). On average, CSS spend twice as much on infrastructure and wages as private schools. These findings suggest that policy to increase access to secondary education in Malawi has to look more towards CDSS as the cost of expanding access to CSS may be unsustainable. But this has to be accompanied with effort to significantly improve the quality of CDSS.

Table 5.16. Costs (Malawi)

school type	cost expenditure	cost salary	total cost	unit cost per student	ratio salary to expenditure
CSS	97028	49628	148014	213	0.51
CDSS	5630	18819	24450	11	3.34
Private	56365	26191	94353	143	0.46

Notes: (1) All costs are yearly and transformed into US dollars from survey data local currency reports (exchange rate: 1 MWK = 0.00137877 USD). (2) Expenditure costs includes the following items: food, water, electricity and vehicles expenditure). (3) Salary cost includes wages for headteacher, deputy teachers, management, graduate teacher, qualified and unqualified teachers, and professional and other support staff. (4) Total cost is the sum of expenditure and salary costs. (5) Unit total cost per student is the ratio of a school total costs divided by the total enrolment.

5.2. Efficiency and Costs

5.2.1. Pass rates, costs and equity

This section presents findings on costs and efficiency and the relationship between costs and the socio-economic background of students in the different types of secondary schools. Figure 5.10 shows the relationship between the total unit cost per student against pass and distinction rates (average rate for 2015 and 2016) for each school.

Generally, what it shows are wide variations in cost-efficiency. Schools with pass rates above 80%, can have unit costs varying by about $500 (see, for instance, see points C and D). Some schools achieve different distinction grades but at the same cost. For example, both school A and B spend the same amount per student in a year ($300), but school A achieves a pass rate with distinction about 40 percent higher than school B. The relative cost efficiency of school A is shown in segment AB.

Figure 5.10 shows that a good number of schools achieve high pass rates at relatively medium costs – a pass ranges from grades 3 to 8. One school achieves a high pass rate at a relatively high cost ($900). Ideally, schools should be able to achieve high pass rates at sustainable costs. Achieving distinctions at lower costs is much more of a challenge. Secondary schools in Malawi may not be sufficiently resourced to increase learning outcomes for most students.

Figure 5.10. Unit cost and pass rates (Malawi)

average rates for 2015 and 2016
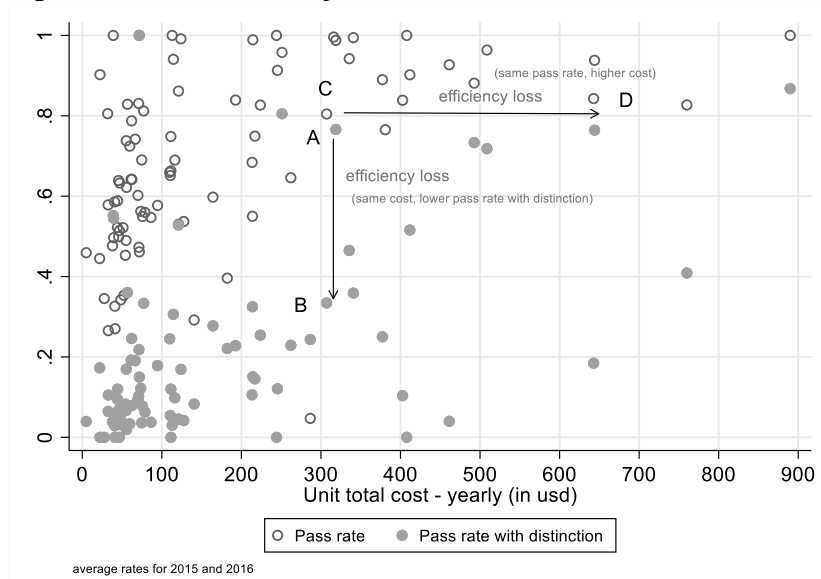
We divided the sample between poorer and richer schools[4] and plotted the total unit cost and pass rate with distinction in Figure 5.11. It shows that most of the poorer schools cluster around a total unit cost of less than $100 and achieve a pass rate with distinction below 20%. Increasing resources to poor schools, for example doubling the unit cost per student, may increase learning outcomes. Figure 5.11 shows a poor school which achieves 80 percent pass rate with distinction at a unit cost of about $250. It is difficult to draw any firm conclusions based on the small sample of rich schools used for this analysis.

Figure 5.11. Unit cost and pass rates by school socioeconomic status (Malawi)

average rates for 2015 and 2016
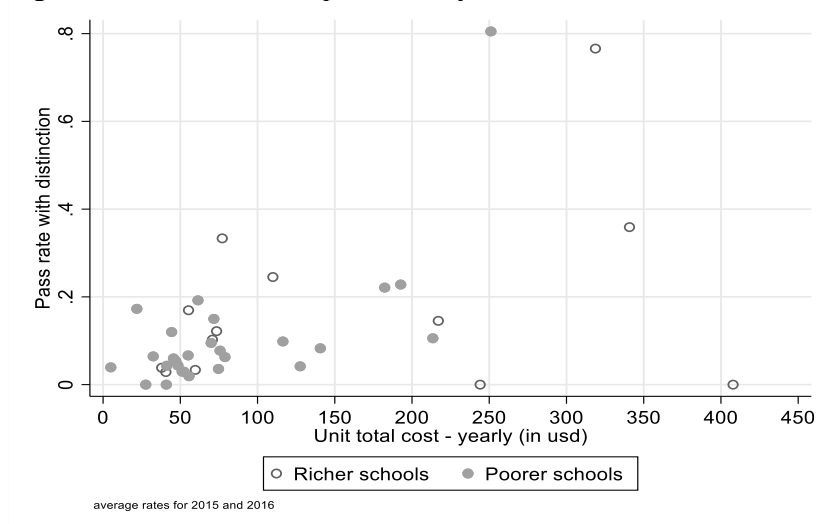
5.3.   Data Envelopment Analysis (DEA)

5.3.1. *Efficiency for different set of outputs*

Overall efficiency

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[4] This is proxied by question 5 (see Appendix 2) that asks about the proportion of disadvantage students in the schools (see also Table 5.4).

For the DEA analysis, the nearer a score is to one, the more efficient the school is (see Appendix 1). Thus, schools reaching the efficient frontier have scores close to or equal to 1. Scores further away from the efficient frontier can be considered as less efficient. DEA efficiency refers to technical efficiency – it describes the relationship between inputs and outputs for each school with respect to an efficiency frontier. Table 5.17 shows schools in Malawi are further from the efficient frontier when completion rates with distinctions[5] is used as the output – the mean score is 0.28. The degree of variability is similar for pass rates and pass rates with distinctions.

The difference on mean efficiency by outputs suggests that for secondary schools in Malawi to increase pass rates with distinctions, they would need better use of a combination of inputs than they currently do to reach pass rates with distinction. Also, 22% of schools (19 out 88) are further away from the efficiency frontier when we base the output measure on pass rates. For pass rates with distinction most schools (72%) do not reach the efficiency (63 schools out of 88). In effect, if a pass rates are used as a measure of how well secondary schools are doing in terms of efficiency, the majority will be considered efficient. However, if we determine high quality by the ability of schools to reach high pass rates with distinction, most schools would not meet this mark.

Table 5.17. Efficiency for different outputs

| Statistics | Achievement | |
	Pass rate	Pass rate with distinctions
Mean	0.78	0.28
Interquartile range	0.35	0.31
Standard deviation	0.21	0.29

Notes: (1) Pass rates refers to the exam at grade 12 for years 2015 and 2016. (2) Flows includes as outputs cohort completion rates (2013-2017) and promotion rates. (3) For further details on the DEA specification and inputs included, see Appendix 1.

There is also no trade-off between school efficiency on pass rates and pass rates with distinction in Malawi (correlation is positive and statistically significant) (Table 5.18, first cell). In fact, the correlation is moderate at 0.46. There is no relationship between pass rates with distinction and flows (the rank correlation coefficient is not statistically different from zero at 5%), but there is an association between pass rates and flows (correlation coefficient p-value is less than 5%). In effect, it is easier for schools to get more students to pass than to get more of them to pass with distinction. If schools in Malawi should produce high pass rates with distinctions, efficiency in the use of resources would need to improve significantly. As earlier noted, a pass grade has a wide range so currently schools are able to get most students through to the final grade and pass with the available inputs. It is much harder for them to get most students to reach the final grade and achieve high pass rates with distinction with current inputs.

Table 5.18. Rank correlation coefficient of efficiency for different outputs (Malawi)

	pass rate	pass rate with distinction	flows
pass rate		0.457	0.251
p-value		0.000	0.028
pass rate with distinction			0.122
p-value			0.308
flows			

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[5] How many students go through the grades to achieve distinction

Efficiency by school type

Again, based on pass rates as the output measure, on average, the most efficient schools in Malawi are still CSS (mean score 0.90), followed closely by private schools (mean score 0.86) (Table 5.19, column 1). CDSS are further away from the efficiency frontier with a mean score of 0.68. The proportion of low, medium and high achieving schools within each school type are similar because the standard deviation (SD) is similar for the three school groups. When we base efficiency on pass rates with distinction (Table 5.19, column 2), we obtain the same ranking, although the gap between CSS and private schools widens, as well as for CDSS with just an average score of 0.19.

Table 5.19. Efficiency by school type (Malawi)

School type		Pass rate	Pass rate with distinctions
		Achievement	
CSS	Mean	0.90	0.45
	SD	0.15	0.29
CDSS	Mean	0.68	0.20
	SD	0.19	0.26
Private	Mean	0.86	0.32
	SD	0.21	0.30

Efficiency by location of school

Using pass rates as the output measure, less efficient schools would be those in rural and peri-urban areas (Figure 5.12). Urban schools are the most efficient; with an efficiency score of 0.85, which is 7 points above the sample average (of 0.78 in Table 5.17). Peri-urban schools are the most efficient schools for the output pass rates with distinction, but because their efficiency for pass rate is below the sample mean (0.74 versus 0.78), this may be an indication of a larger selection within peri-urban schools.[6]

Figure 5.12. Efficiency score by location (Malawi)

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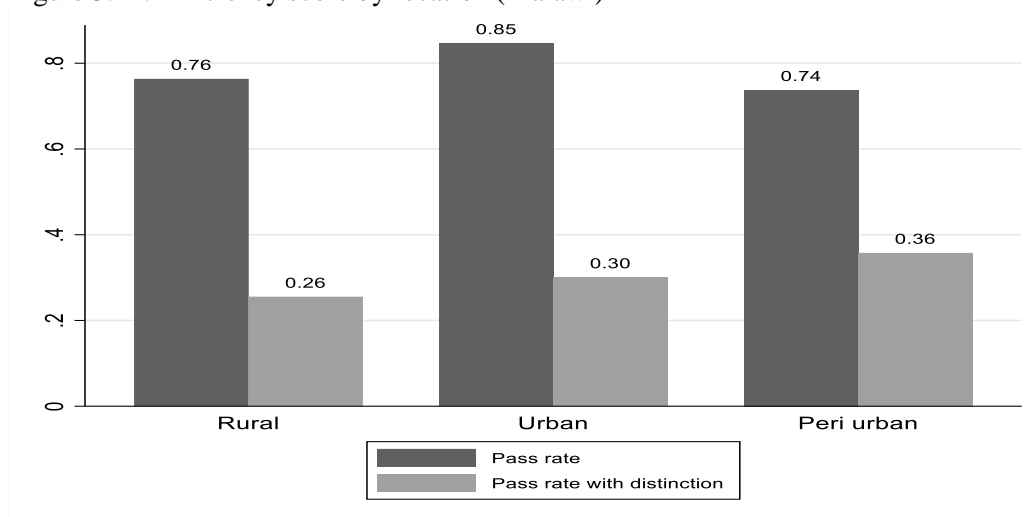
[6] Note, however, that only differences for pass rates and between rural and urban schools and between urban and peri-urban schools have p-values of around 13%-14% (still above 10%); for the other four comparisons, the mean tests' p-values are quite larger (above 25%). Hence, all differences are not statistically significant at conventional levels, with small samples sizes being perhaps the main reason.

5.3.2. Cost and equity

How much of technical efficiency can be explained by students' socioeconomic background? For example, are more underprivileged schools less efficient? Does technical efficiency vary more or less across poorer schools or across richer schools? Figure 5.13 shows that schools with a low to moderate degree of wealth disadvantage are more efficient than those whose proportion of disadvantage students is high. Although in the majority of schools technical efficiency is further away from the efficient frontier, technical efficiency levels in poorer schools are about half the levels in more advantaged schools.

Figure 5.13. Efficiency scores by degree of school's disadvantage (Malawi)
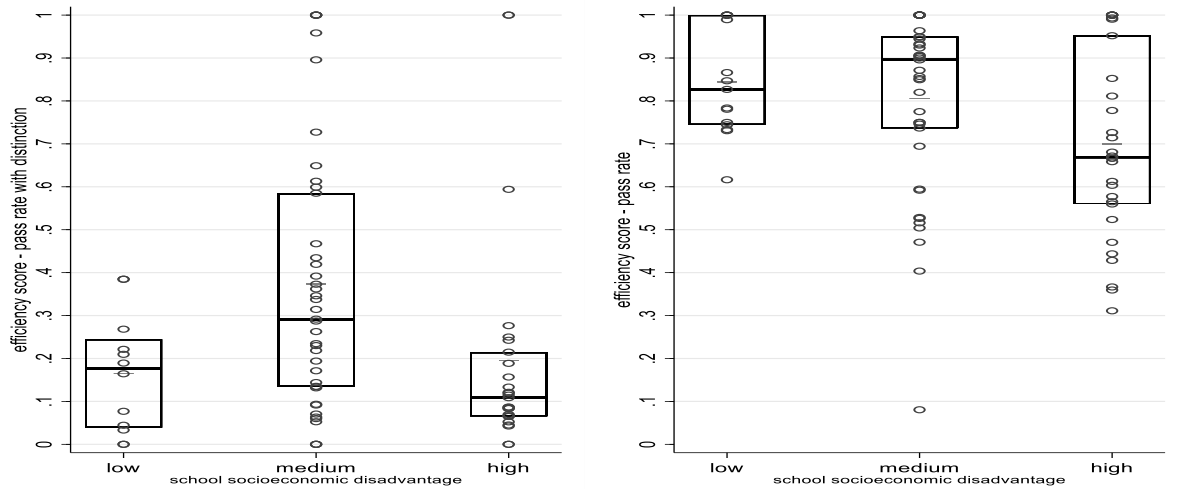
Figure 5.14 is a plot of technical efficiency scores against total unit cost. First, for output measure pass rates with distinctions, most schools are clustered at the bottom left section of the plot, with unit costs below $100 for efficiency scores below 40% - low spending appears to be associated with low technical efficiency. Higher unit costs are generally associated with higher efficiency – output measure based on pass rate with distinction. With pass as the output measure, many schools are able to achieve a relatively high degree of efficiency at lower costs (consistent with earlier results).

Figure 5.14. Technical efficiency and cost efficiency (Malawi)
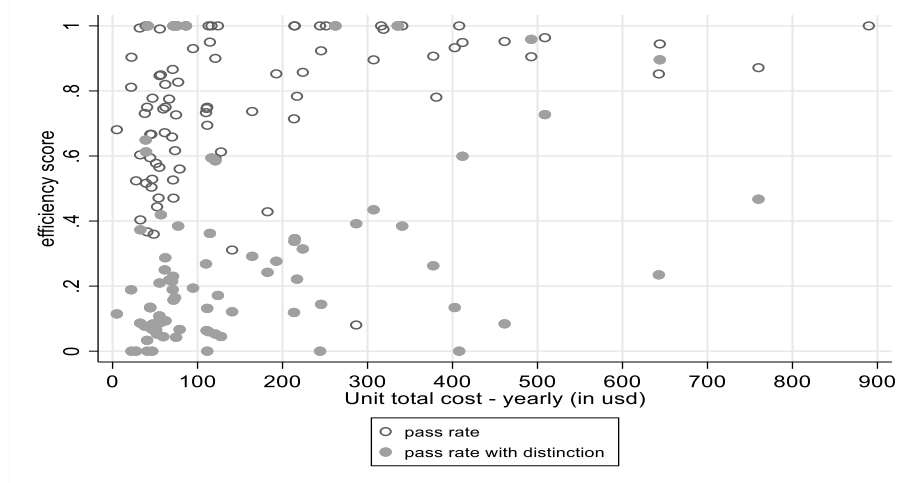
When we explored together technical efficiency (TE) and cost efficiency (CE) by school type, the region where schools achieve TE and CE simultaneously are located in the top left corner (Figure

5.15).[7] Most CDSS schools have low TE and low unit cost (bottom left quadrant). There are however a few CDSS which, despite their underprivileged context, seem capable of reaching both types of efficiency.

For many CSS, as unit costs increases technical efficiency increases as well. The pattern is less discernable in the case of private schools. However, it would appear that for many private schools generally technical efficiency does not improve with increasing unit costs.

Figure 5.15. Technical efficiency and cost efficiency for pass rates with distinction by school type (Malawi)
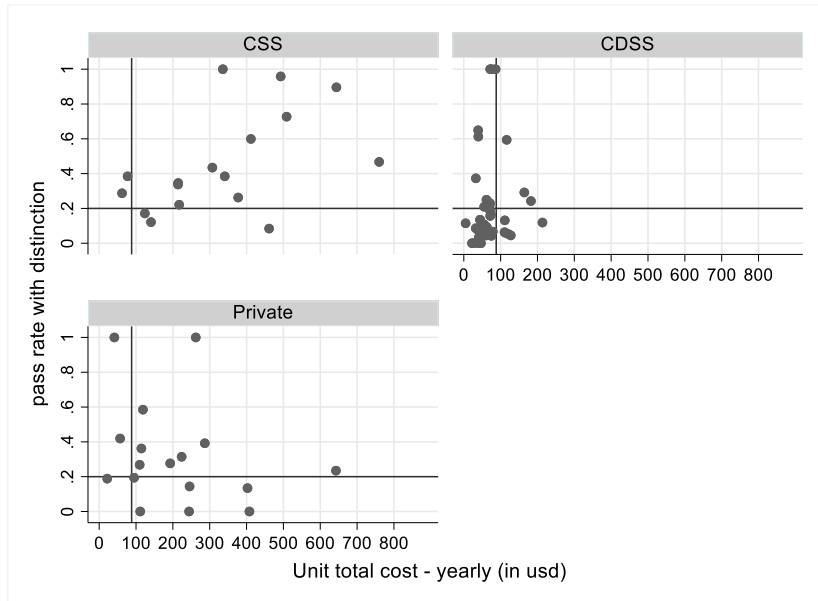
Costs in boarding schools is much higher than day schools mainly because of feeding and high infrastructure costs. Figure 5.16 shows efficiency between boarding and day schools. The results are revealing. For pass rate as output measure of efficiency, many day schools achieve an efficiency score of 40% and above for about $100 unit cost.

Figure 5.16. Efficiency by day or boarding school (Malawi)
A – Pass Rates   B – Pass Rate with Distinction
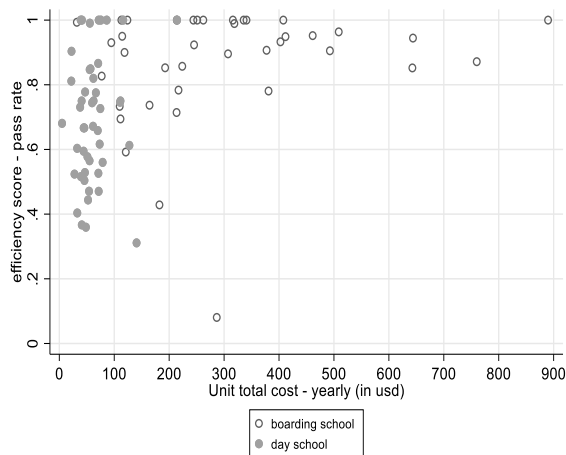
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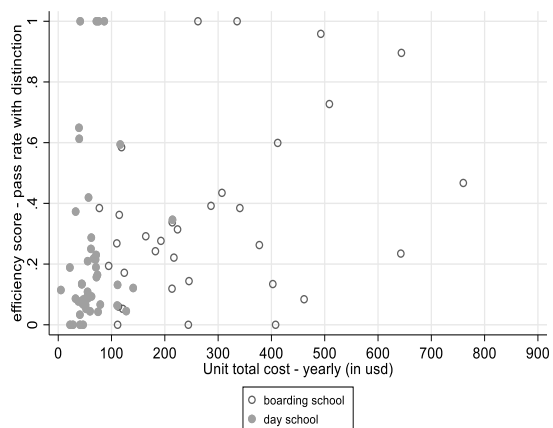
[7] The quadrants are defined by the median values of total unit cost and the efficiency score.

Boarding schools clearly are not as cost efficient; in general, they spend more to achieve higher pass rates than day schools (diagram A). When we use pass rate with distinction as the output measure (diagram B), many day schools struggle to achieve this output with unit cost of about $100 unit. For boarding schools there is a bigger spread. It appears that the more expensive boarding schools achieve higher pass rates with distinction, but not surprising perhaps since they recruit more advantaged students and have more resources. A few, spend more than day schools and achieve similar level output as day schools. But if day schools are to reach higher levels of quality (pass rates with distinction), clearly they would need more investment.

A policy to invest in boarding CSS (building more CSS or increasing spaces) to accommodate more students from this analysis is not a good decision. It will cost a lot more, will not be sustainable and equitable. Since some CDSS appear to achieve high quality at unit cost of about $100, it will be worth exploring further how they achieve this success.

5.3.3. *Characteristics of the most and less efficient schools*

Table 5.20 shows the characteristics of the group of schools with high technical efficiency (with scores approaching or equal to 1) and those which are less efficient (bottom 25% of efficiency score distribution for pass rates).

Table 5.20 Characteristics of the most and less efficient schools (Malawi)

	Efficiency based on pass rates		
	Efficient	Low efficiency	Difference
School enrolment - total	408.9	361.9	46.99
Ratio of qual vs nonqual teachers	8.9	4.5	4.39
Ratio of teachers total to professional support staff	5.4	8.9	-3.45
School students classroom ratio	54.7	48.9	5.86
Student teacher ratio based on qualified teachers	27.2	31.5	-4.33
Headteacher - female	0.3	0.0	0.28
Headteacher - age	51.1	49.7	1.46
Headteacher - education level	1.7	1.7	-0.03
Headteacher - years of work experience as principal in total	10.1	9.8	0.26
School administration training	0.9	1.0	-0.01
Financial management training	0.7	0.8	-0.08
Participated in professsional development activities	0.4	0.5	-0.06
Teacher - Hiring of new teacher is responsabnility of school	0.61	0.80	-0.19
Teacher turnover, this year	0.12	0.11	0.01
Teacher excess	0.68	0.68	0.01
Teacher - Professional development supported	0.83	0.70	0.13
Teacher - Professional development supported and participated	0.67	0.70	-0.03
Management - Teacher regularly produce lesson plans for inspection	0.22	0.40	-0.18
Mean class size (for main subjects)	62.95	88.21	-25.26
Ratio for proportion of school days spent on examinations versus teaching	0.21	0.15	0.06
Proportion of students walking more than 3 km	0.18	0.45	-0.27
Proportion of students cycling more than 3 km	0.09	0.15	-0.06
School receives info on how well it is doing - total	2.50	2.10	0.40
The school participated in: Program to support school management	0.50	0.15	0.35
The school participated in: Program to improve teacher performance	0.28	0.20	0.08
The school participated in: Program to improve student performance	0.17	0.20	-0.03
Autonomy - Preparation of the school budget	2.61	2.50	0.11
Autonomy - Allocation of resources inside the school	2.50	2.50	0.00
Index - IT	0.13	0.09	0.04
Index - Infrastructure	0.15	-0.33	0.49
Enrolment rate growth between 2013 and 2017	0.65	29.61	-28.96
Enrolment rate growth between 2015 and 2017	0.38	135.53	-135.15
Unit wage cost of qualified teacher - per month (in usd)	0.24	0.11	0.13
Unit wage cost - per month (in usd)	7.94	4.74	3.19
Unit expenditure cost - per month (in usd)	7.97	1.60	6.37
Unit total cost - per month (in usd)	19.18	6.35	12.83
Ratio of wage to expenditure cost	7.51	34.53	-27.02

The following conclusions can be drawn from this analysis:

- Efficient schools have a higher proportion of qualified teachers compared to non-qualified teachers.

- Efficient schools have a lower mean class size than less efficient schools, and generally participated in programs to support school management
- Efficient schools are more likely to provide support for teachers' professional development and have considerably lower average class size (for key subjects) than less efficient schools.
- Efficient schools receive more feedback on how well they are doing from different stakeholders, have more autonomy and are more likely to have participated in programs on school management to improve teacher's performance.
- The more efficient schools have not increased enrolment significantly over the last 2 to 4 years. Oer this period their unit costs have increased. This would suggest that rapid increases in student enrolment can have a negative knock on effect on efficiency especially if this is not accompanied by increasing resources.
- Efficient schools have a lower wage to expenditure and a higher unit expenditure per month. It would appear that with moderate increase in enrolments and increased expenditure they have been able to achieve high output relative to less efficient schools.

5.3.4. *Efficiency and teacher characteristics*

Experience on the job, age and salary matters in the production of efficient schools. (Table 5.21). In efficient schools, teachers' salaries are more closely linked to teacher experience than in less efficient schools (Table 5.22). This is true whether the output is based on pass rates or pass rates with distinction. This close association is shown by the differential correlation coefficients. The correlation coefficient of teachers' salary with teachers' experience is 0.352 for efficient schools and just 0.113 for less efficient schools; likewise, it is 0.490 and 0.285 for efficient and less efficient schools (for efficiency based on pass rates with distinctions).

Table 5.21. Difference on teachers' characteristics for efficient and low efficient schools (Malawi)

	Pass rate				Pass rate with distinction			
	Efficient	Low efficiency	Diff	t-test	Efficient	Low efficiency	Diff	t-test
Teacher - female	0.74	0.74	0.00	n	0.77	0.74	0.03	n
Teacher age	43.34	42.53	0.82	y	40.33	44.12	-3.79	y
Teacher experience	15.98	17.27	-1.29	y	14.46	17.83	-3.37	y
Teacher experience in current school	5.21	4.83	0.38	y	4.54	4.81	-0.27	n
Teacher salary	169926	152812	17114	y	159768	152812	6956	n

Table 5.22. Correlation coefficient between teacher experience and his/her salary for efficient and low efficient schools (Malawi)

	Efficient	Low efficiency
Pass rate	0.352	0.113
Pass rate with distinction	0.490	0.285

6. Conclusions and Policy Recommendations

It is striking that students who attend CSS mostly in urban areas live much closer to their schools which are often boarding schools, whereas students who attend Community Day Secondary Schools (CDSS) live much further away and walk longer distances to school. Boarding schools cost more and for the poor will be inaccessible. Future growth in access to secondary education in Malawi will have to come from expanding access to community day secondary schools, but these schools need more investment to improve their quality.

Judging from the data, CDSS tend to be smaller schools. Urban schools enrol twice as many students as schools in rural areas. Peri urban schools are of medium size. This presents challenges for expanding access to secondary education at affordable costs. For CSS in towns and cities, a policy option would be to increase the ratio of day to boarding students since CSS students live much closer to their schools compared to CDSS.

The practice of offering remedial classes for underperforming students in private and CSS schools improves their pass rates but not in the case of CDSS. The bigger impact of remedial classes is also correlated with repetitions. CDSS provide greater access to poor households than CSS and need an injection of resources to improve the quality of teaching and learning. Teaching in CDSS has to be made attractive to attract the best teachers to improve learning outcomes.

All schools rely on additional income (representing on average about 81% of total funding). Private schools receive almost all their income from fees (about 95%), and although are considered low-fee paying schools their costs would exclude the poorest who seek a secondary education. But, they provide relatively better quality than CDSS which cost much less than low-fee private schools. If the quality of CDSS improves at affordable costs they could compete with low-fee private schools and provide choice for poor households. The reliance on school charges and PTA contributions can create inequitable access to quality secondary education in Malawi. It has implications for improving school efficiency. With over 80 percent of students from disadvantaged backgrounds, relying on fees and income from households, CDSS in particular are unlikely to have enough recurrent funds to run efficiently.

The number of PCs connected to the internet, PCs for school management and PCs per student across all school types is very low. Improving IT infrastructure and use in schools should be part of a medium to long-term policy priority. This has the potential to enrich the quality of the learning experience in secondary schools. Although this study did not investigate school curriculum issues, the eight case studies indicated little diversification in curriculum delivery. Schools concern was mostly with accessing adequate textbooks and learning materials and improving basic infrastructure. A 21st century secondary education has to look towards increasing access to PCs and the internet. This has to, at least, be part of a long-term vision of improving access to quality secondary education in Malawi. Inequitable access to computers can become another tool for perpetuating inequitable access to quality secondary education. Access to ICT in secondary schools interconnects with accessibility and connectivity to electricity. This may be the biggest challenge to improving ICT in rural secondary schools in addition to other relevant elements such as, finance, infrastructure, personnel and their training, software, and textbooks.

The indications for the analysis of costs suggests that secondary schools in Malawi may not be sufficiently resourced to increase learning outcomes for most students. Pass rates are generally high and easier to achieve for most schools. But for secondary schools in Malawi to improve their quality for all, if pass rate with distinctions is used as a measure of quality, then a better use of a combination of inputs or increased inputs may be needed. We found that about 22 percent of schools (19 out of the 88) are further away from the efficiency frontier when we base the output measure on pass rates, but using pass rates with distinction as our output measure, about 72 percent of schools fail to reach this efficiency frontier. Thus, if we determine high quality by the ability of schools to reach high pass rates with distinction, most secondary schools in Malawi would not meet this mark.

Schools with a low to moderate degree of wealth disadvantage are more efficient than those whose proportion of disadvantage students is high. Although in the majority of schools technical efficiency is further away from the efficient frontier, technical efficiency levels in poorer schools are about half the levels in more advantaged schools. This means students in rural schools are receiving relatively poor quality secondary education. It adds to the importance of increasing investment in secondary education in rural areas to improve equity in quality.

Insights into the factors which make schools efficient in the Malawi context can be used by policy makers to develop standards for improving quality. They include ensuring that: (a) a higher proportion of qualified teachers compared to non-qualified teachers; (b) class sizes are lower and school management is improved; (c) all secondary school teachers, irrespective of their location have good access to professional development; (d) schools and stakeholders have good information on how well their students are performing compared to other schools; (e) expansion of access to secondary education goes with increased resources. Rapid increases in student enrolment can have a negative knock on effect on efficiency if not accompanied by increasing resources. (f) schools maintain a low wage to expenditure ratio. Moderate increases in enrolment and accompanied by increased expenditure can ensure the quality of secondary education is maintained.

There needs to be a robust inspection and advisory system in place to ensure that all secondary schools in Malawi meet minimum standards of practice considered appropriate, but also that they operating to maximise learning outcomes for all. Improving the quality and availability of data from secondary schools will be useful in monitoring capacity and quality. It will also ensure that new investment in secondary education is based on reliable and valid data on verifiable performance indicators.

Parent Teacher Associations are contributing significantly to the cost of running secondary schools in Malawi. Evidence from the case studies suggest that this can be a source of inequitable quality to secondary education. Richer communities provide more and therefore add to the quality of secondary schools serving in those communities. The policy of free secondary education has to address the role of PTAs and ensure that schools in rural areas are not disadvantaged as a result of PTA contributions filling in financing gaps of the policy.

Internal management of schools is crucial to running an efficient school. Ideally, an efficient school is where the interaction between different stakeholders is cordial and mutually reinforcing so that the teachers are happy to teach, parents are willing to send their children to school, and children enjoy the learning process. What is clear from the case studies is the lack of transparent reportage on efficiency through an effective governance system.

The Malawi 2016 National Education Policy notes that governance and management of secondary education is problematic because of understaffing, unavailability of laboratories, inadequate funding, limited classroom capacity, lack of relevant and responsive curriculum and poor management of resources (GoM 2016: 6). One of the policy objective is to improve the operations and efficiency of the education system through good governance and management to deliver education services efficiently and effectively. The policy strategy to achieve this is through decentralized management of secondary schools; improved conditions of service for secondary school teachers; improved regulatory framework on stakeholder participation in the delivery of secondary education; increased funding levels to secondary education; strengthening capacity of secondary education governance and management at all levels; and finally, improvements in accountability and transparency in running secondary schools in Malawi. These policies target the system, when as seen in this study, schools function face different financial and logistical challenges.

There are indirect political economy issues arising from the findings of the research. Creating a secondary school system that works to improve quality for all will be achieved if only the ecosystem factors that influence how schools are run receive policy attention. School governing boards must have real power to manage schools and hold headteachers and teachers accountable. Training for headteachers in the management of secondary schools also needs investment and policy attention so

they are better able to offer quality leadership that can produce efficient and effective secondary schools in Malawi. The incentive for secondary schools to operate more efficiently and be held accountable for the resources they consume is lacking. Free secondary education in Malawi has to be accompanied with significantly improved management of the increased resources that will be required to achieve equitable access for young people in Malawi.

What are the implications of the findings for providing 'free' secondary education in Malawi. First, the country needs to ensure there is improved access to the poor at the primary level to make free secondary education equitable. Second, by making secondary education free for all irrespective of whether a student attends a CDSS or CSS will make secondary education highly inequitable. To approach more equitable access, the government should consider making all day attendance free whilst at the same time increase resources to CDSS to raise quality. Households that wish to access boarding secondary education are more likely to be able to afford it and therefore should not benefit from 'free' secondary. As our analysis shows, boarding CSS cost much more but also have the capacity to generate additional income that CDSS cannot match. A combination of free day schools and improved investment in community secondary schools will constitute a pro-poor policy which is also more sustainable. In effect, a free secondary education policy should seek to close the quality gap between CSS and CDSS. CSS in towns and cities may have more capacity to increase enrolment than CDSS, and a mapping exercise could determine which can do so, and the excess capacity used to enrol day students.

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8. Appendix 1. Efficiency conceptualisation and framework

8.1. Data Envelopment Analysis (DEA)

The DEA consists of building an envelope of the most efficient combinations of inputs and outputs by solving a linear optimization program (Farrell, 1957; Charnes et al., 1978). The efficient combination of inputs and outputs of a given decision making unit (often a firm but in our context a school) define a production frontier, which defines a standard performance and the evaluation of each unit is with respect to that standard. That is, the DEA calculates the boundary of the best productive practice possible and estimates an efficiency parameter that is a result of the distance of the unit with respect to the frontier. There are other assumptions within DEA like convexity of production function, type of return to scale etc.

There are two types of efficiency one could measure within DEA: with respect to outputs or with respect to inputs. In the latter, it implies the reduction one could achieve in inputs without modifying the level of output (on the frontier) and in the former case to obtain the maximum level of output given a fixed level of inputs. We follow the second approach –that is, an output orientated maximisation.

Graphically, let assume there are two schools: school j with a combination of inputs (say teacher numbers, PCs, and infrastructure) and outputs (say of learning scores) given the frontier of production J (Figure 8.1). There is a second school k, with a frontier K. Each frontier represents the maximum output for a given set of input where each dot represents a student (which a specific learning score/output). Now, combining these two frontiers with DEA gives a new envelope efficient frontier for the two schools E. The distance J1E1 is the inefficiency of school j with respect to efficient frontier; the distance K1E2 is the inefficiency of school k with respect to the efficient frontier. The relative efficiency is the ratio J0J1/J0E1 for school j, and for school k is K0K1/K0E2. If the ratio is one, schools are using a combination of inputs and outputs on the absolute efficient frontier, hence they are efficient reaching the maximum output for their set of inputs. This ratio can be defined as λ. The further the relative efficiency or λ is from one, the less efficient a school is. Here, we assume that λ is measuring technical efficiency: how inputs are transformed into outputs.

Figure 8.1. A graphical representation of efficiency - DEA
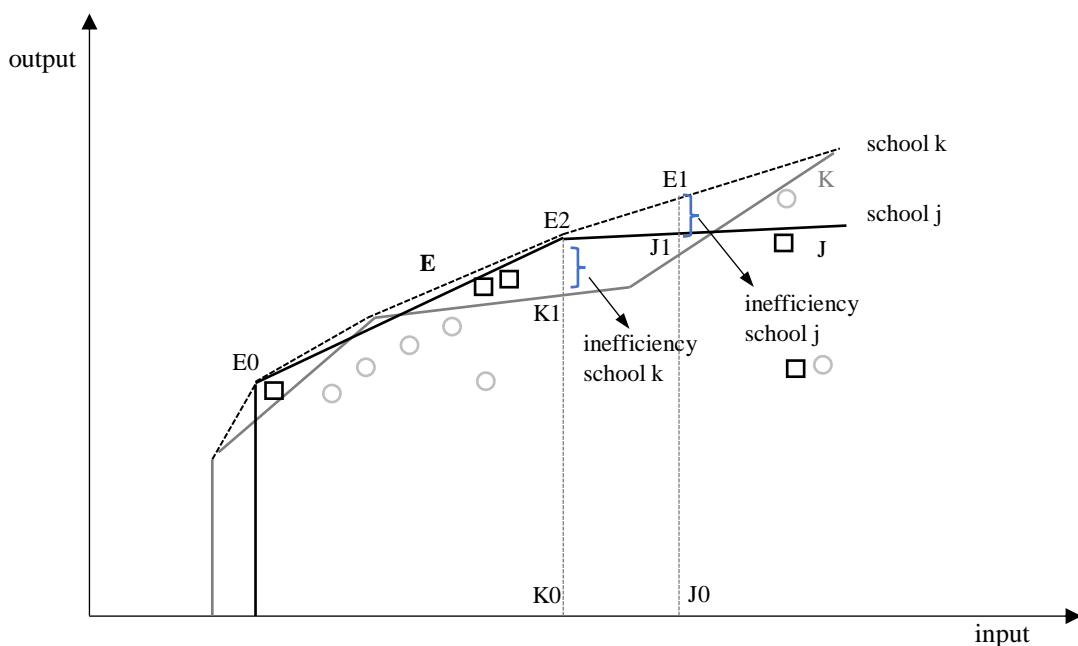
DEA assumes the existence of a production possibilities frontier (the envelop) that defines which linear combination of observed input-output bundles are feasible. The relative efficiency of unit j can be defined as weighted outputs (r) to the weighted inputs (i): $e_j = \sum_r \bar{u}_r y_{rj} / \sum_i \bar{v}_i x_{ij}$, where $\bar{u}_r$ and $\bar{v}_i$ are the prices of outputs (y) and multipliers of inputs (x). Because multipliers are unknown, linear programming problem generates the multipliers as a by-product of the statistical estimation process. The "output-oriented envelopment" program that aims to maximize the output production of each decision-making unit (DMU) (e.g., a school) subject to a given input level can be formulated as follows. Let's consider the problem for DMU 1,

$$max\delta_1 \qquad (\text{and } \delta_1 \geq 1) \qquad\qquad (8.1)$$

$$\sum_j \lambda_j y_{rj} \geq \delta_1 y_{r1} \qquad r = 1, \dots, s \qquad\qquad (8.2)$$

$$\sum_j \lambda_j x_{ij} \leq x_{i1} \qquad i = 1, \dots, m \qquad\qquad (8.3)$$

$$\sum_j \lambda_j = 1 \qquad\qquad (8.4)$$

$$\lambda_j \geq 0 \quad \forall\, i,j,r \quad \text{and} \quad \delta_0 \text{ unconstrained} \qquad\qquad (8.5)$$

The solution is given by (8.1) which represents the output-efficient score. It indicates the proportion by which the s outputs need to increase for DMU1 to be located on the production possibility frontier. In other words, it measures "technical efficiency" as the distance to the production frontier. If $\delta_1 > 1$, the DMU1 would be located inside the frontier, i.e. it is inefficient, and if $\delta_1 = 1$, DMU1 is efficient as it is located on the frontier. Equation (8.2) is the output constraint, indicating that the weighted sum of outputs from all DMUs in the sample must be greater than or equal to the potential output for DMU1, given the input constraint (Equation 8.3). There indicator λ_j is a constant representing the weights with which the DMU replicates the behaviour of the others DMUs in regards the use of inputs to produce outputs. This sum must be less or equal than the input available for DMU1. Each λ_j is applied to compute the location of an inefficient DMU if it were to become efficient. The maximization problem is solved as many times as DMUs in the sample.

Our empirical approach uses two outputs (and three formulations: pass rates, distinctions and flows) and four inputs (Table 8.1). Note that both inputs and outputs must be positive. We estimate the model using a radial measure of technical efficiency and variable returns to scale (VRS).

Table 8.1. Data Envelopment Analysis (DEA) specification

Outputs			Inputs	
Pass rates	y11	pass rates for year 2015	x1	student teacher ratio
	y12	pass rates for year 2016	x2	student PC ratio
	y21	pass rates with distinction for year 2015	x3	teacher PC ratio
	y22	pass rates with distinction for year 2016	x4	school infrastructure
Flows	y31	cohort completion rates (2013 - 2017)		
	y32	promotion rate (100 - dropout - repetition)		

Notes: (1) Pass rates refer to the exam at grade 11. (2) School infrastructure is calculated as the student's ratio for the following infrastructure items: number of laboratories, number vehicles, number of students per dormitory and number of in use toilets.

As explained above, through DEA we estimate technical efficiency, that is, we are able to find which schools falls into the set of efficient schools. This is the first part of the argument: finding schools located in the set TE of Figure 4.1 (see Section 4). We discuss the other set of efficiency, cost efficiency, and the overlap of the two types of efficiency below.

8.1. Cost efficiency

Achieving learning outcomes implies some unit cost for a school composed by the teaching workforce payments and the expenditure related to infrastructure of the school. This total cost can be transformed into a unit cost by dividing by the total enrolment of the school. If a school achieves a given value of learning outcomes (say, a pass rates) at a higher cost than a comparable school, then it can be said that this schools is cost inefficient. Alternatively, if the school achieves the same level of learning outcome at a lower cost, then it can be said the school is cost efficient.

It should be noted that, here, we are not dealing with the issue of technical efficiency (which is provided by the DEA) as we only focus on cost and learning outcomes. Here we are focusing on the efficiency of DMU (schools) in the set describe by CE in Figure 4.1; this set can or cannot overlap with the group of technical efficient DMU (schools).

Another definition, beyond comparison at the same level of cost or the same level of learning outcomes across schools to establish whether a school is either cost efficient or not, is how the degree of cost efficiency varies across schools that spend more or less. That is, what is cost efficiency gradient (increase of learning over unit increase on costs) across the distribution of costs. This is important from the point of view of finding at which level of (unit cost) further increase do not contribute to larger cost efficiency because of decreasing returns to school expansion activities.

Figure 8.2 Cost efficiency
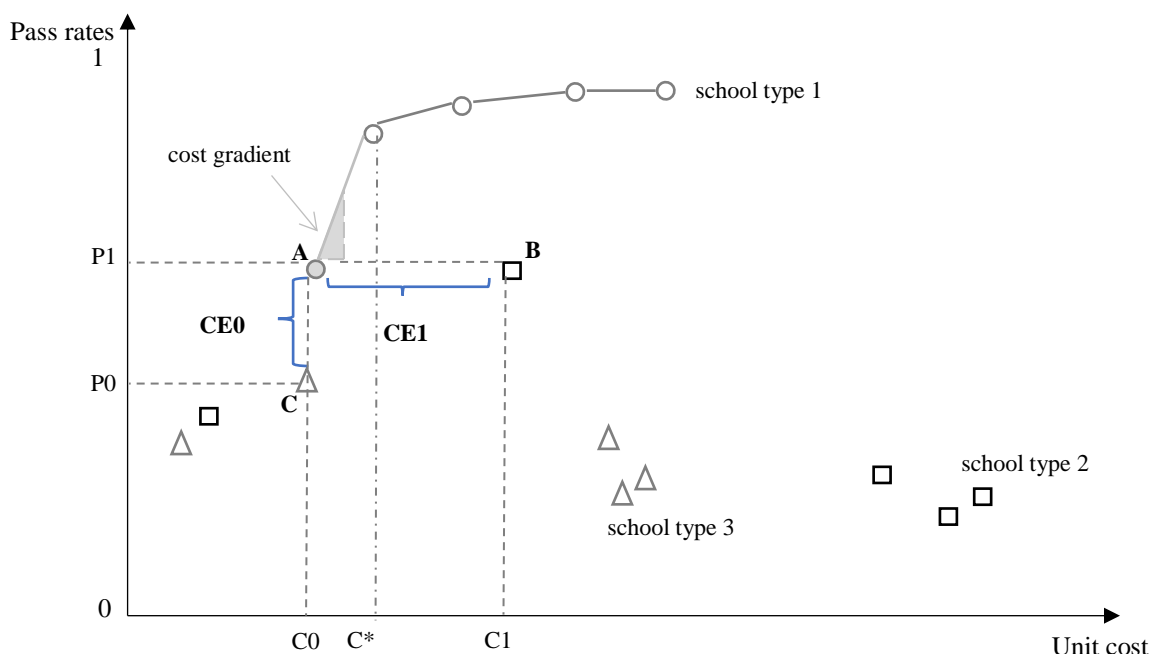
Figure 8.2 presents these different cost efficiency scenarios. We plotted 15 schools, 5 for 3 different school types (each type denoted by circles, squares and triangles). The y-axis represents pass rates and the x-axis unit total cost. School A is more cost efficient than school B as it reaches the same level of pass rate P1 but a lower unit cost (the difference of C1 minus C0). The cost efficiency here is CE1 (and

in relative terms CE1/ C1). Likewise, school A is more cost efficient than school C because it obtains at the same cost C0 a larger pass rates (the difference between P1 and P0). The cost efficiency here is CE0 (and relatively as a ratio CE0/P1). Additionally, looking at school of type 1 (hollow circles) we can see that increasing unit cost leads to larger pass rates. But the increase on pass rates for unit increase of costs (the gradient) diminishes from the level of unit cost C*. Hence, it is not cost efficient for schools with a profile of cost as those from school type 1 to incur in unit cost above this threshold. The figure also shows that school type 2 are the less efficient (e.g. same pass rate but larger cost than school type 3, bottom right of figure).

8.2. Technical efficiency and cost efficiency

Here we present how one could empirically find those schools which are technically efficient and cost efficient at the same time. These schools are shown by the intersection of the TE set and the CE (Figure 4.1) and shows cases where affordable efficiency increases can be located. These are cases like school A (Figure 8.2) with estimate technical efficiency on the frontier of maximum possibilities given the set of outputs ($\delta = 1$).

Figure 8.3. Technical and cost efficiency
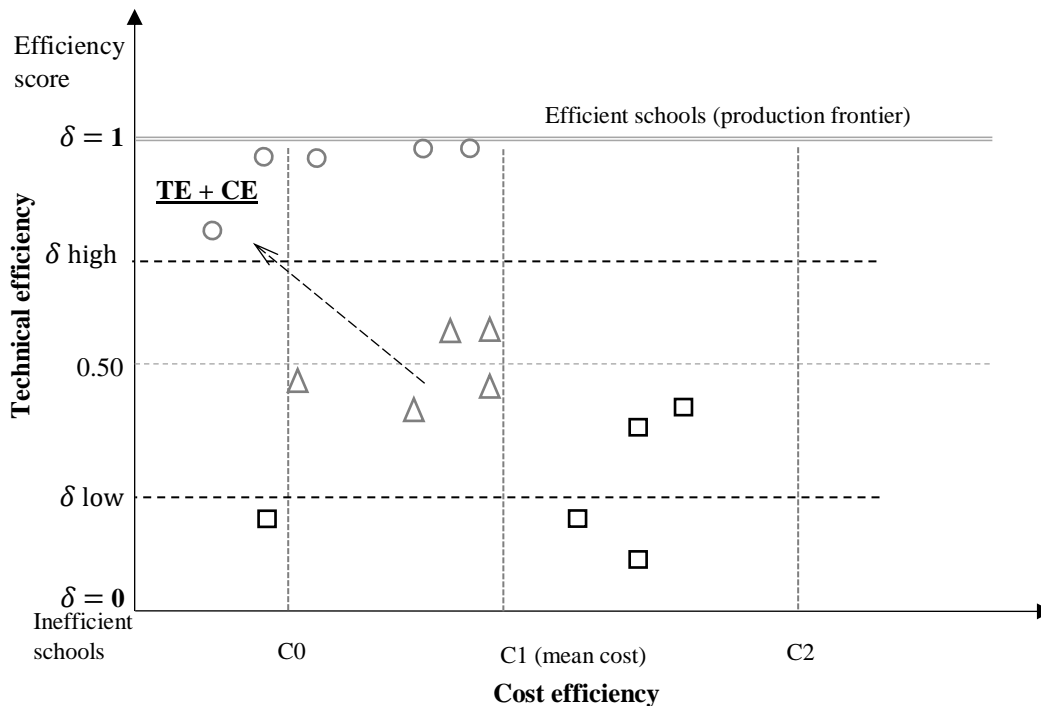
Figure 8.3 includes a scatter plot of the estimate efficiency score for each school alongside the unit cost for each school. Recall that $\delta=1$ are technically efficient schools, in the frontier, and when δ tends to zero schools are less efficient. Ideally all schools would like to move toward the region TE+CE where technical and cost efficient are achieved, because the score of efficiency is high (above δ high) and the unit cost is low (below C0). Note that the same comparison by either fixing a level of efficiency score and comparing costs across schools or fixing the unit cost and compare efficiency score permits to identify cases where either one or both type of efficiency can be raised in parallel.

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9. Appendix 2. Questionnaire

US

UNIVERSITY
OF SUSSEX

IMPROVING EFFICIENCY AND EFFECTIVENESS OF SECONDARY EDUCATION IN AFRICA (EESSA) Research Project

QUESTIONNAIRE – MALAWI

This questionnaire is divided into five parts:

Part I: Background questions about the school
Part II: Background and questions about headteacher
Part III: Questions about secondary school teachers, technology and management
Part IV: Questions on enrolment, transitions, achievement and trends
Part V: Questions on infrastructure, facilities and expenditure

Preface

What is the survey about?

This survey is being administered in Malawi and Uganda to understand in each country the factors that contribute to the efficiency of secondary education in sub-Sahara Africa to improve students' academic performance

How will the information be used?

Your information will help us to understand the key issues that relate to efficiency and effectiveness of secondary schools in Malawi

You will receive a summary of the information collected in your country so that you can compare your situation to other schools in the country where secondary education is provided.

For further information on this research and any other questions, you may contact Dr Joseph Chimombo on jchimombo@hotmail.com or 0999940956

or Professor Kwame Akyeampong of the Centre for International Education University of Sussex [a.akyeampong@sussex.ac.uk], the Principal Investigator who leads this research project.

How should you respond to this questionnaire?

The questionnaire should be completed by the headteacher or delegated official. Some of the questions ask information

about which you may have to consult staff members in your school. Once you have all the necessary information, the questionnaire should take about 45 to 60 minutes to complete.

If you do not know an answer precisely, your best estimate will be adequate for the purposes of this survey. An enumerator from the research team will be on hand to assist in filling the questionnaire

Your answers will be kept strictly confidential. All information that can identify you or your institution will be removed and not identifiable in the final report. Thank You!

0

Country	Malawi
Province	
District	
Location:	
Urban	
Semi-urban	
Rural	

Examination Center ID					
School					
Postal address					
Tel.					
Principal or designate	1. Name:		2. Tel	3.Email address:	
		Permission to use telephone	Yes / No		
Full names of surveyors	1. Name:		2. Surname:		
	3. Tel:		4. Email address		
Date:	Time of arrival:		Time of departure:		

1 What is the school type?
Mark only one

a School type

CSS	CDSS	ODSS	Private

2 Is your school a boys only, girls only or mixed school?
Mark only one

Boys	Girls	Mixed

3 About what percentage of your total funding for a typical school year comes from the following sources?

a How much from paid fees

b Other charges (exams, costs of textbooks, uniform, food, etc.)

c Donations (e.g. Parent Teacher Association (PTA) contributions)

	%
	%
	%
100	%

4 Which of the following best describes the area in which your school is located
Mark only one

A <Rural area>
A <Small town>
A <Town>
A <City>

5 Think about the level of wealth of the area where this school is located. What proportion of students are from socioeconomically disadvantaged homes?
Mark only one
(Socioeconomically disadvantaged homes' refers to:
-homes lacking the basic necessities or advantages of life, such as adequate housing, nutrition or medical care or in terms of the towns or parental profession of students)

	1% to 33%	34% to 66%	67% to 100%
Students from socioeconomically disadvanatged homes			

6 Based on your records for this school year, how many students are enrolled in each secondary school Form?

a Boys

	Form			
	1	2	3	4
Currently enrolled				

b Girls

	Form			
	1	2	3	4
Currently enrolled				

7 Looking at your records for the last school year, how many students have dropped out and repeated in each secondary school Form?

a Boys

Form	Dropped out	Repeated
1		
2		
3		
4		

a.1. If there are dropouts, the common reasons for dropout for boys are

- a.1.1 Lack of school fees
- a.1.2 Indiscipline at school
- a.1.3 Mistreatment at home
- a.1.4 Death of parent or guardian
- a.1.5 Expulsion
- a.1.6 Poverty
- a.1.7 Other (specify)

b Girls

Form	Dropped out	Repeated
1		
2		
3		
4		

b.1. If there are dropouts, the common reasons for dropout for girls are

- b.1.1 Lack of school fees
- b.1.2 Indiscipline at school
- b.1.3 Mistreatment at home
- b.1.4 Death of parent or guardian
- b.1.5 Pregnancy
- b.1.6 Marriage
- b.1.7 Other (specify)

8 What secondary school subjects are offered in this school?

- a English
- b Mathematics
- c Chichewa
- d Physical Science
- e Geography
- f Biology
- g Chemistry
- h History
- i Agriculture
- j Woodwork
- k Technical drawing
- l Metal work
- m Other (specify)

9 How many students were enrolled....

Boys	Girls

a Total enrolment in the school

b At the end of the first school term

10 For each type of position listed, provide the number of staff (full-time and part-time) currently working in your school

If a full-time person is working in more than one position (e.g. a librarian, or deputy principal with teaching status),
include that person in the category where he/she spends the larger part of the statutory working time.

	In the whole school	
	Full-time	Part-time

a. Male
a.1 School management personnel (principal, deputy principals)
a.2 Classroom teachers (directly involved in teaching)
a.3 Teaching assistants (non-professional personnel who provide instruction or support teachers in providing instruction)
a.4 Professional support staff
   a.4.1. Bursar
   a.4.2. Secretary
   a.4.3. Librarians
   a.4.4. Laboratory technicians
   a.4.5. IT support staff
a.5 Other support staff
   a.5.1. Accounts
   a.5.2. Security
   a.5.3. Cooks
   a.5.4. Grounds
   a.5.5. Messenger
   a.5.6. Secretary

b. Female
b.1 School management personnel (principal, deputy principals)
b.2 Classroom teachers (directly involved in teaching)
b.3 Teaching assistants (non-professional personnel who provide instruction or support teachers in providing instruction)
b.4 Professional support staff
   b.4.1. Bursar
   b.4.2. Secretary
   b.4.3. Librarians
   b.4.4. Laboratory technicians
   b.4.5. IT support staff
   b.4.6. School nurses
b.5 Other support staff
   b.5.1. Accounts
   b.5.2. Security
   b.5.3. Cooks
   b.5.4. Grounds
   b.5.5. Messenger
   b.5.6. Secretary

END OF PART I

Part II: BACKGROUND AND QUESTIONS ABOUT HEADTEACHER

11 Are you female or male?

Female	
Male	

12 How old are you?

	years

13 What is the highest level of formal education you have completed?
Mark with an X only one option per row

Diploma	
Degree	
Higher – Masters or above	

14 Do you have a teacher qualification from teacher education?

	Yes
	No

15 How many years of work experience do you have?
Please write a number in each row. Count part of a year as 1 year.

a As a principal at this school	years
b As a principal in total	years
c In other school management roles (do not include years working as a principal)	years
d As a teacher in total (include any years of teaching)	years
e Working in other jobs	years

16 How were you appointed as principal of this school?
Mark with an X one or more options below.

a By public advertised position	
b By choice of school governing board.	
c Through transfer by the education authority	
d By decision of school owner.	
e By joint decision of the school governing board and the local education authority	

17 Did the formal education you completed include the following and, if yes, was this before or after you took up a position as principal?
Mark with an X only one option per row

	Before	After	During	Never
a School administration or principal training programme or course				
b Teacher training/education programme or course				
c Leadership training or course				
d Financial management				

18 In the last year, did you participate in professional development activities aimed at you as principal, and if yes, for how many days?
Mark with an X only one option per row

	Yes	No	Number of days
a In a professional network, mentoring or leadership training			
b Other courses, (conferences, seminars or workshops)			

19 How do you agree or disagree that the following present barriers to your participation in professional development?

Mark with an X one choice in each row

	Strongly disagree	Disagree	Agree	Strongly agree
a Professional development is too expensive/unafforable				
b There is a lack of employer support for professional development				
c Professional development events conflicts with my work schedule				
d Family responsibilities make it difficult for me to attend professional development activities				
e There is no professional development offered				
f There are no incentives for participating in professional development activities				
g Distance to centres of professional development is an issue				

END OF PART II

Part III: QUESTIONS ABOUT SECONDARY SCHOOL TEACHERS, TECHNOLOGY, MANAGEMENT

20 Please provide the following information for all teachers at this school

name (two initials)	Teacher number	Gender	Age	Teacher rank	Total teaching experience (years)	Teaching experience in the current school (years)	Major Subject	Form taught	Qualification	Approx. salary a month (local currency)

21 Is the hiring of new teachers at your school the responsibility of the school? (e.g. the principal's or the department's heads')

If teachers are assigned to your school by an external agency, e.g., a government agency or school district, the answer to this question should be 'No'

Mark with an X only one option.

	Yes
	No

22 Teacher's turnover

Please answer this and the following question even if hiring teachers is the responsibility of another organisation (like the local or regional school if none, write '0'

	Appointed	Left
a How many teachers were appointed last year and how many left?		
b How many teachers were appointed this year and how many left?		

	Appointed	Left
c How many teachers were appointed last year and how many left for each subject?		
c.1 Basic Sciences		
c.2 Applied Sciences		
c.3 Humanities		
c.4 Languages		
c.5 Arts		
c.6 Technical		
c.7 Other (specify)		

	Appointed	Left
d How many teachers were appointed in the last 3 years and how many left for each subject?		
d.1 Basic Sciences		
d.2 Applied Sciences		
d.3 Humanities		
d.4 Languages		
d.5 Arts		
d.6 Technical		
d.7 Other (specify)		

23 Which of the following methods were used to cover these vacancies?

Tick one box in each row

	Yes	No
a Subject we offer was cancelled		
b No action was taken		
c Courses (topics in a course) were added to other teachers' normal teaching hours		
d Some classes were combined		

24 In which subject areas is it difficult to hire a fully qualified teacher in your experience?

Tick one box in each row

	Yes	No
a Basic Sciences		
b Applied Sciences		
c Humanities		
d Languages		
e Arts		
f Technical		

21 Is the hiring of new teachers at your school the responsibility of the school? (e.g. the principal's or the department's heads')

If teachers are assigned to your school by an external agency, e.g., a government agency or school district, the answer to this question should be 'No'

Mark with an X only one option.

	Yes
	No

22 Teacher's turnover

Please answer this and the following question even if hiring teachers is the responsibility of another organisation (like the local or regional school If none, write '0'

	Appointed	Left
a How many teachers were appointed last year and how many left?		
b How many teachers were appointed this year and how many left?		

	Appointed	Left
c How many teachers were appointed last year and how many left for each subject?		
c.1 Basic Sciences		
c.2 Applied Sciences		
c.3 Humanities		
c.4 Languages		
c.5 Arts		
c.6 Technical		
c.7 Other (specify)		

	Appointed	Left
d How many teachers were appointed in the last 3 years and how many left for each subject?		
d.1 Basic Sciences		
d.2 Applied Sciences		
d.3 Humanities		
d.4 Languages		
d.5 Arts		
d.6 Technical		
d.7 Other (specify)		

23 Which of the following methods were used to cover these vacancies?

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	Yes	No
a Subject we offer was cancelled		
b No action was taken		
c Courses (topics in a course) were added to other teachers' normal teaching hours		
d Some classes were combined		

24 In which subject areas is it difficult to hire a fully qualified teacher in your experience?

Tick one box in each row

	Yes	No
a Basic Sciences		
b Applied Sciences		
c Humanities		
d Languages		
e Arts		
f Technical		

25 | What is the teaching group size for each subject?

	Form 1	Form 2	Form 3	Form 4
	Number	Number	Number	Number
a Basic Sciences				
b Applied Sciences				
c Humanities				
d Languages				
e Arts				
f Technical				

26 | Which ways does your school support or encourage the professional development> of teachers?

By professional development (PD) we mean any activity that develops an individual's skills, knowledge, expertise and other characteristics as a teacher. These include formal courses as well.

Tick one box in each row

	Yes	No
a The school has a separate budget used for the professional development of teachers		
b The school provides time for teachers to go on professional development courses		

(e.g. by building in professional days within the regular school year; by organising replacement for teachers attending courses)

	Yes	No
c The school organises staff development activities		
(e.g., peer observation of classes, mentoring of young teachers, workshops on teaching subjects,)		
d The school collects and circulates information on professional development courses in the district		
e Teachers are allowed time for professional development which they pay for by themselves		

27 | Consider the past school year. To what extent have teachers participated in professional development activities?

Tick one box in each row.

	Not at all	Sometimes	A lot
a Subject related professional development activities			
b Non subject related professional development activities			

28 | Consider the past school year. Did any of the teachers in your school participate in the following kinds of professional development activities?

Tick one box in each row.

	Yes	No	N/A or don't know
a Courses or workshops on subject matter, methodology and other education related topics			
b Conferences/workshops where teachers present their teaching ideas and discuss educational problems			
c Degree programme (e.g. qualification programme e.g. Master's)			
d Observational visits to other secondary schools			
e Regularly-scheduled collaboration among teachers on issues of instruction (do not include administrative meetings)			
f Mentoring and/or peer observation and coaching as part of a formal arrangement that is recognised or supported by the school or educational authorities			
g Participation in a professional network of teachers (e.g., one organised by an outside agency or over the Internet)			

29 | Teacher management

Tick one box in each row.

	Yes	No
a Teacher regularly produce lesson plans for inspection		
b Does your school have records of teacher attendance		
c It is difficult to know when a teacher is absent from school		
d A system of appraisal is in place for all teachers		

e What are the most common reasons for absence

	Yes	No
e.1 Attending Funeral		
e.2 Sickness		
e.3 Family Responsibilty		
e.4 Casing Salary		
e.5 Other (specify)		

30 How many school days do you have in a year

	Number
a Last year	
b Of these school years, how many days was the school closed?	

31 On average what proportion of school days are spent on the following

a Teaching		%
b Examinations		%
c Sporting activities		%
d Music, Dance and Drama		%
e Waiting time after examinations		%
f Other (specify)		%
	100	%

32 How often are the following factors considered when students are admitted in your school?

Tick one box in each row

	Never or rarely	Sometimes	Often or always
a Whether they are resident in the catchment area of the school			
c Entrance examination			
c Whether student's parents were former students			
d Performance in a previous school			
e Whether student is from a socio-economically poor background			

33 For day students: means of transport and distance of residence to school

a Mean of transport. What proportion travel by:

Car		%
Bus		%
Motorcycle		%
Bicycle		%
Walking		%
	100	%

b Average distance of residence to school

0-1 Km		%
1-3 Km		%
3-5 km		%
5+ km		%
	100	%

34 In general, how often does your school group students using the following methods

Tick one box in each row

	Never or rarely	Sometimes	Often or always
a Students are grouped according to their choice of programme or subjects (e.g. General science)			
b Students are grouped based on their performance in the various subjects			

35 Does your school keep the following records?

Tick one box in each row

	Yes	No
a Disciplinary records		
b Teachers scheme of work		
c Teachers lesson plans		
d Student performance in school (e.g. scores on tests and assignments)		
e Student absenteeism		
f Results of final examinations		
g Health records		

36 What does your school do about students who are underperforming?

Tick one box in each row

	Yes	No
a Ask them to repeat		
b Offer remedial classes		
c Move them to another school		
d Involve parents		
e Do nothing		

37 Does your school receive information on how well it is doing from one or more of the following groups?

Tick one box in each row

	Yes	No	N/A or don't know
a Regional, national education authorities (e.g. inspectorates)			
b The local school authority			
c External examination boards (students' results)			
e Parent groups (e.g. School Governing Board, Parent Teacher Association)			
f Teacher groups (e.g., Staff Association, trade union)			
g Alumni Groups			

38 In this school year, has the school participated in any of the following programs?

Tick one box in each row

	Yes	No
a Program to support school management		
b Program to support teacher competences		
c Program to improve student performance		

Information technology

Questions 41 to 46 ask about the use of information technology in your school.
'Computers' in this section include computers capable of supporting other multimedia equipment such
as a CDROM and a sound card. Pocket computers or computers used only for recreation should be excluded from the answers.
Educational purpose in this section refers to the use of computers for planning, organising, and
evaluating student learning, and the use of computers as a teaching and learning tool. E.g. retrieving
demonstration material from the <internet>, editing of information, preparing demonstration material,
preparing tasks and tests, correcting student work, demonstrating and practicing of information search on the <internet/www.>, etc.

39 How many computers (workstations) are in your school?

Write a number in each row. If 'none', write 0.

	Number
a Available for headteacher's office	
b Available in the school altogether?	
c Available for students altogether	
d Available only for final year students?	
e Available only for teachers' use?	
f Available only for the administrative staff	
g Connected to the Internet/World Wide Web? (www)	
h Connected to a local area network (LAN, intranet)?	

40 How many computers would be adequate for your school?

	Number
a Students	
b Teachers	
c Management	

41 What has prevented the school from having all the computers it needs?

Mark with an X one or more options below.

a Lack of funding	
b Lack of internet connectivity	
c Lack of electricity	
d Lack of expertise to use them	
e Other (please specify)	

42 Do teachers at your school use....

Tick the box in each row.

	Never or almost never	Occasionally	Frequently
a Computers for educational purposes? e.g. use computer in classroom as a medium of instruction, for demonstration purposes, as a learning tool, process results etc.			
b The world wide web (WWW)/internet for educational purpose? e.g. to collect demonstration material, to teach information search, to network students with students, etc.			
c <e-mail> for educational purposes? e.g., to send and receive homework, give feedback to students, etc			

43 How much are computers used by students on a regular basis

Tick one box in each row

	Not at all	A little	A lot
a To learn and work during lesssons			
b To obtain information from the Internet			

44 Do you consider any of the following an obstacle for using IT in your school?

Tick one box in each row

	Obstacle	Not an obstacle
a Insufficient number of computers for teachers' use		
b Insufficient number of computers for students' use		
c Outdated computers (older than 3 years)		
d Shortage of maintenance and technical support		
e Not enough copies of software for instructional purposes		

f Not enough variety (types) of software

g Poor quality of available software

h Difficult to integrate computers into classroom instruction practices

i Internet connection not available

j Difficult to use with low achieving students

k No time in the school schedule for using the <Internet/WWW>

l No time in teachers' schedule to explore opportunities for using the <Internet/WWW>

m Lack of interest/willingness of teachers to use computers

n Teachers' lack of knowledge/skills in using computers for instructional purposes

o Not enough training opportunities for teachers

p Lack of support from the school governing body or community

q Weak infrastructure (telecommunications including network, electricity, etc.)

45 Please indicate your level of agreement with the following statements regarding your experience in this school

Mark with one X only one option in each row.

	Strongly disagree	Disagree	Agree	Strongly agree
a Decision making in this school is a shared responsibility between my self, the deputy head and teachers				
b Former students of the school provide financial and material assistance to the school				
c I have the quality of teachers to achieve good results				
d It is easy to attract teachers to teach in this school				
e The school governing board has the capacity to support management of this school				
f The school governing board has access to resources to support management of this school				
g It is difficult to hold teachers to account in this school				
h I manage the school with little input from other staff.				
i The teachers in this school take a big part in how it is managed.				
j The school would find it difficult to operate without financial contributions from parents				
k The size of the student population makes it difficult to manage this school well.				

46 Please indicate your level of agreement with the following statements regarding your experience in this school

Mark with one X only one option in each row.

	It is decision exclusively taken by the school	It is a decision shared between the school and people external to	It is a decision exclusively taken by outsiders
a Selection of teachers to be hired			
b Dismissal of teachers			
c Initial salaries of teachers			
d Salary increases of the teachers			
e Preparation of the school budget			
f Allocation of resources inside the school			n/a
g Establish disciplinary policies of the students			
h Establish policies for assessing students			
i Approve the admission of students to the school			
j Determine the time allocated to subjects on the school timetable			
k Decide how many teachers the school needs			
l Decide on teacher transfer			
m Decide the composition of the school management or governing board			
n Decide infrastructural needs of the school			

END OF PART III

Part IV: QUESTIONS ON ENROLMENT, TRANSITIONS, ACHIEVEMENT AND TRENDS

47 How many enrolled in the following years?

a Boys

Year	Number enrolled
2013	
2014	
2015	
2016	
2017	

b Girls

Year	Number enrolled
2013	
2014	
2015	
2016	
2017	

48 How many students enrolled in 2013 progressed up to 2017?
Fill each corresponding cells

Year		Numbers
2013	enrolled dropout repeated	
2014	promoted to 2014 from 2013 cohort dropout repeated	
2015	promoted to 2015 from 2013 cohort dropout repeated	
2016	promoted to 2016 from 2013 cohort dropout repeated	
2017	2013 cohort starting in 2017	

49 The following questions ask about students in form 4
Consider the following school years and answer the following questions for each of them 2016; 2015; 2014, 2013.
Even if you do not have an official record, please provide your best estimate, if you have information

	Number of students			
	2016	2015	2014	2013
a How many students were ENROLLED in form 4 for each of the following year?				
b How many students REACHED AND SAT the exam?				
c How many students PASSED the exam?				

d How many students PASSED WITH HIGH GRADES (A and B) in the exam?

e How many students REPEATED the final year?

50 For the last two academic years provide the following student information for students of Form 4

Academic year 2016

Subject	Enrolled	Took the exam	Grade achieved									
			Distinction (1-2)		Credits (3-6)					Pass (7-8)		Fail
			1	2	3	4	5	6		7	8	9
All												

Academic year 2015

Subject	Enrolled	Took the exam	Grade achieved									
			Distinction (1-2)		Credits (3-6)					Pass (7-8)		Fail
			1	2	3	4	5	6		7	8	9
All												

Part V: QUESTIONS ON INFRASTRUCTURE, FACILITIES AND EXPENDITURE

51 The following questions refer to your school infrastructure and facilities

a Number of classrooms by form

Form	Boys - number enroll	Girls - number enroll	Number of streams
1			
2			
3			
4			

	Number
b How many CLASSROOMS are there in your school (count classrooms that are used for instruction excluding laboratories and techical or vocational workshops)	
c How many laboratories are there in your school?	
d How many technical and vocational classrooms?	
e Take a typical average classroom. Estimate the size of a typical classroom in square metres (you can ask for this to be measured for a more accurate estimate)	

	Yes	No
f Does the school have enough equipment to do basic experiments (such as microscopes, weighing machines, bunsen burners etc.?)		
g Do students have to work in groups to use the basic materials to do experiments because there aren't enough for everyone?		
h Does your school have basic facilities to teach technical or vocational subjects?		

	Never	Once a week	Twice a week	Three times per week	Four times per week	Everyday
i How often are laboratories used?						
j How often are technical or vocational workshops facilities used?						

k Is your school a boarding school?

No	Yes

If school is a boarding school

Boys	Girls

k.1 How many dormitories are there?

15

k.2 How many students, on average, occupy a dormitory?

k.3 How much was spent on feeding students for last term?

Local currency

No	Yes

l Is your school both a boarding and day school?

If school is a boarding and day school

Number

l.1 How many students are boarding?
l.2 How many attend as day students?

m Electricity
m.1 How much do you spend on electricity last year?

Local currency

m.2 Who provides the electricity?

m.3 How often did you have power cuts in the school last year?
   Tick one box in each row

Ofen	Rarely	Never

n How much do you spend on water in a year?

Local currency

o State the number
o.1 How many toilets are there in this school?
o.2 How many toilets are in use in this school?

Number

If your school is mixed
p.1 How many toilets are allocated for girls?
p.2 How many toilets are allocated for boys?

Number

o Does the school own any vehicles

No	Yes

If school owns any vehicles

o.1 How many vehicles does the school own

o.2 What type of vehicles
o.2.1 Lorry
o.2.2 Bus
o.2.3 Minibus

Number

o.3 Approximately how old (years) are the vehicles

o.4 On average how much does the school spend a year on fuel for running its vehicles

Local currency

q Does the school hire any vehicles

No	Yes

If school hires any vehicles

q.1 How many vehicles does the school hire

q.2 What type of vehicles

Number

q.2.1 Lorry

q.2.2 Bus

q.2.3 Minibus

q.3 On average how much does the school spend a year on fuel for running its vehicles

Local currency

r On average how much does your school spend a year for maintenance of school infrastructure?

Local currency

52 The following questions refer to personal emoluments (salaries) of staff in your school before tax

Local currency

a How much does a headteacher earn?

b How much does the deputy headteacher earn?

c How much does the average unqualified teacher earn?

d How much does the average professional support staff earn?

e How much does the average other support staff earn?

END OF PART V

END OF EESSA QUESTIONNAIRE