

The Impact of School infrastructures on the Quality of Education in Quelimane District

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Abstract: This study was designed to analyze the impact of school infrastructure on the quality teaching in suburban schools in Quelimane district. The physical deficiencies related to insufficient classrooms, precarious sanitary facilities, lack of running water and inadequate teaching materials contribute for low achievement and attendance rates of the students. Qualitative and quantitative method was the used as methodological approach in this study was used. Data collection included applied surveys of 420 students and 78 teachers, as well as semi-structured interview was used for 18 school principals and 12 community stakeholders. On the other hand, report analysis, observation approach for 20 suburban schools and descriptive statistical were used in order to achieve the required goal. The results indicate significant deficit in more than 60% of school infrastructures visited, such as: lack of adequate facilities, increased rates of absenteeism, grade repetition, a negative impact on teacher motivation and pedagogical performance. It is concluded that infrastructural improvement is a necessary condition for raising the quality of education. Besides this, an integrated intervention on physical rehabilitation, teacher training, provision of materials and community participation is recommended as priorities to be taken into consideration within the framework of public policies.

Keywords: School Infrastructure; Teaching Quality; Education; Suburban School.

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I. INTRODUCTION

Education is one of the main pillars for human and social development and is also an essential instrument for reducing social inequalities. In urban and suburban context, extending access to education has been a state priority, however the increase in the number of students has not been accompanied by proportional investments in school infrastructures. This situation created a reality of school overcrowding, physical deficiencies and insufficient teaching resources, compromising the quality of education. The lack of school

infrastructures represents not only a logistical challenge, but also pedagogical and social challenge. On the other hand, degraded classrooms, lack of desks, absence of potable water and other basic facilities impact directly in the academic quality, teacher motivation and student retention in schools. In this context, national and international studies indicate that these conditions are essential for academic framework and improve student engagement. In case of Quelimane, increasing population pressure and limited investment capacity make this problem more urgent. In this context, the present study aims to analyze the deficit of school

infrastructures and its impact on the quality of education, considering the perceptions of students, teachers and the participation of the community. About methodological approach, in this study was used a combining qualitative and quantitative methods, questionnaires, including semi-structured interview and systematic observation of the physical conditions of school infrastructures. This study is relevant because it provides a detailed analysis of the conditions of public schools in suburb areas, identifying gaps and proposing specific suggestions. By understanding how infrastructures influence the education process, it becomes possible to formulate public policies and strategies that contribute to a more inclusive, equitable and quality education, aligned with national education and human development goals.

II. THEORETICAL FRAMEWORK

The discussion about the importance of infrastructure for the quality of education occupies the first place in studies on educational policies, especially in the context of developing countries. Several authors and international organizations emphasize that school is limited to teachers and curricula, but it is also the matter of physical space that can either facilitate or hinder learning. Bronfenbrenner's ecological theory, widely applied in the field of education, argues that the immediate environment in which a child develops directly influences their cognitive and social development. In this sense, the school as a microenvironment only fully fulfils its function when it offers adequate physical conditions.

UNESCO (2014), emphasizes that deficient physical environment such as overcrowded classrooms, lack of ventilation, insufficient lighting, absence of potable water, and inadequate sanitation facilities undermine pedagogical efforts, reduce school attendance, and disproportionately affects girls who increased barriers when safe female toilets are not available. This situation leads to greater vulnerability to school dropout, compromising goals of equity and gender equality. The World Bank, in its 2018 World Development Report reinforces this argument by demonstrating that schools lacking physical resources face greater difficulties in implementing active teaching methodologies, such as group work, hands-on experiences and extracurricular activities.

In the context of Mozambique, studies and official reports from the Ministry of Education and Human Development (MINEDH, 2020), highlight the urgent need for investment in school infrastructures.

According to MINEDH (2020), the Strategic Education Plan 2020-2029 prioritizes the expansion of the school network and the rehabilitation of classrooms, recognizing demographic pressure and budgetary constraints exacerbate inequalities in access to quality education. In the suburban areas of Quelimane district, this reality is evident such as school overcrowded with students, classes with more than sixty students, lack of libraries, insufficient furniture, toilets in precarious conditions and a shortage of potable water. The better physical infrastructure facilities contribute for better

student results and consequently contribute for lower dropout rates.

Understanding the local reality, we can say that the quality of the school's physical space is directly correlated with student motivation and the ability of teachers to apply more dynamic and participatory methodologies. In degraded environment, teachers tend to restrict themselves to expository practices, focused on memorization, limiting the development of higher cognitive skills such as analysis, synthesis and evaluation. On the other hand, teachers who teach in schools with minimum conditions of comfort and safety feel more valued and motivated, willing to invest in pedagogical innovation. While in degraded conditions of school infrastructures, besides originating the sense of institutional abandonment, it creates demotivation of teachers, absenteeism and high turnover. In pedagogical framework, this means less continuity in schoolwork and less effectiveness in monitoring the learning process.

Beyond this its direct impact on learning, it is also necessary to understand that the better school infrastructure is also related to issues of social justice. In cities like Quelimane, where the majority of the population depends on public schools, structural deficiencies contribute for inequalities, as only families with more resources can enroll their children in private institutions with better conditions. Thus, the precariousness of the infrastructure perpetuates cycles of exclusion and poverty, limiting the rich of the principle of education as a universal right.

Scheerens (2011), suggests that the quality of education should be understood in three dimensions: inputs, processes and output. Infrastructure is part of the inputs, creating conditions for pedagogical processes to occur effectively, guaranteeing better outputs in terms of learning outcomes. Without adequate inputs, processes are compromised and outputs tend to be inferior. This confirms that school infrastructure is not merely logistical support but a fundamental element of educational quality.

Therefore, in case of Quelimane, the deficit in school infrastructure should be seen not only as a material deficiency, but as a structural obstacle to human and social development. In this case, improving the physical conditions of schools is a necessary condition for consolidating the right to education and promoting equity, even if it needs to be accompanied by other factors such as teacher training, curriculum review and community support.

III. METHODOLOGICAL APPROACH

The research was designed using a mixed methods approach, combining quantitative and qualitative methods. This methodical choice was justified by the need to obtain not only objective and quantifiable data but also to understand the perceptions an experience of the main participants involved in the education process. The articulation between these two methodological approaches enriched the analysis and allowed us for a more contextualized interpretation on the local school reality. On the other hand, the study was structured as

descriptive and exploratory research, focusing on the reality of schools and its infrastructure conditions in suburban areas of Quelimane district. To ensure representativeness, a cluster sampling method was used, which included twenty (20) schools as follow: 10 schools located in urban area and 10 located in suburban area. This distribution allowed us to observe and analyze the conditions between schools with some level of investment and those located in rural areas where the deficits tend to be more visible. In these schools were selected the following participants: 420 students, 78 teachers, 18 headmasters and 12 community representative members from different areas where the schools are located. This diversity of participants allowed the triangulation of information, strengthening the validity of the results.

As instruments of data collection, the study used a structured inquiry applied to the students and teachers, regarding classroom overload, class comfort, access to toilets, perceptions about learning process, the impact of physical conditions on teaching and professional motivation. The semi-structured interviews were used for directors and community representative members regarding to infrastructure management, available financial resources, maintenance initiatives and perceptions related to the effect of physical conditions on academic performance. Besides these instruments, this study also used a systematic observation in which the participants of each school had to complete a detailed checklist in order to evaluate the conditions of classrooms, quality of furniture, lighting ventilation, sanitary conditions, existence of libraries, availability of teaching materials and accessibility. On the same context, photographs were taken, with permission in order accurate the real status image of the infrastructures. About documental analysis, the study analyzed the reports from education sector, attendance and performance statistics of the students were consulted, as well as school management plans which have been made available by the schools. This document analysis complemented and contextualized the data collected in schools.

IV. PRESENTATION OF RESULTS

The data collection made it possible to draw a detailed portrait of the situation of school infrastructure in Quelimane district and the impact that these conditions have on equality of education. The results have been presented in three main blocks: the state of infrastructure, school attendance, performance indicators and perceptions of the different participants involved in this study.

The process of observation in 20 schools revealed significant deficits. In 13 institutions, 65% of classroom conditions were classified as critical. The walls had significant cracks, the roofs had leaks that required the suspension of the classes during the raining period, and in seven schools, the floors were made of precarious materials, exposing students to dust and mud. In 11 schools, desks and benches were damaged, forcing two or three students to share a single seat. The furnitures were also proved as insufficient. In some rooms, students were forced to sit in the floor. Natural lighting was poor in five schools due to broken or

blocked windows and none of the schools visited had regular electrical lighting.

Regarding to hygiene conditions, 14 schools did not have enough toilets for the students. The facilities were in poor state of repair, without doors or separation by gender, causing embarrassment, especially for teenage students. In 12 schools, there was no drinking water supply, forcing students to go to community sources. As for pedagogical sources, only five schools had libraries or resource centers. The remaining establishments had lack of book support, maps, and materials. This situation limited the performance of practical activities and access to supplementary study materials. Statistical data collected alongside school leadership confirmed a strong association between infrastructural conditions and educational indicators. In schools with critical infrastructure, the average annual absenteeism rate was 18%, while in schools with better conditions the absenteeism did not exceed 9%. About the failure rates, the study followed the same pattern: 22% in the most disadvantaged schools compared to 11% in the relatively better equipped schools. During the interviews, principals and teachers reported that on days of heavy rain, many classes did not have lessons due to a lack of suitable physical conditions of the classrooms, which contributed for the failure of many students on exams at the end of academic year. From a gender perspective, it was found that girls were more affected by the school infrastructure deficit, because of the absence of separate toilets and lack of potable water for personal use. And this contributed for more absenteeism for many students of this group. On the other side, teachers also underline that some students missed up a week or a month due to inadequate conditions, which directly impacted their academic performance.

➤ *Teachers' Perceptions about Physical Conditions of School Infrastructure*

According to teachers' perceptions, they unanimously stated that the poor physical conditions of the schools reduced pedagogical effectiveness. On the side, they reported that in overcrowded classrooms, it was impossible to apply participative methodologies of learning. In this sense, teaching in degraded environment does not create motivation and generates a feeling of abandonment and professional devaluation by the authorities.

➤ *Community Perspectives about the Importance of Education*

The community members who have been interviewed during the data collection, emphasized that despite recognizing the importance of education, they face financial limitations that prevent them from contributing significantly to the improvement of schools. The priority cited by most of them was the rehabilitation of toilets and ensuring access to potable water, followed by the construction of new classrooms. They also demonstrated willingness to support basic maintenance to what is possible to be done with few basic financial resources while the need for greater intervention should be done by the state and international partners.

V. ANALYSIS AND DISCUSSION OF RESULTS

The analysis of the collected data reveals that the lack of school infrastructure constitutes the main obstacle in order to promote the quality of education. The results obtained from different literatures, demonstrated that there is a relationship between the school physical conditions and academic performance. On the hand, it was confirmed that the learning environment plays a determining role in student achievement, teacher motivation and gender equality.

Table 1 – State of School Infrastructure in Quelimane District (N=20)

Observed conditions	Number of Schools	Percentage
Classrooms with cracks/degraded ceilings	13	65%
Precarious floor	7	35%
Insufficient/damaged desks	11	55%
Poor natural lighting	5	25%
Lack of libraries in good condition	15	75%
Lack of potable water	12	60%
Sanitaries in poor condition	14	70%

These results reinforce the fact that the deficit in school infrastructures affect multiple essential aspects of school life, from hygiene to access to basic educational resources.

➤ *Physical Conditions and Learning Environment*

Observations made in schools revealed that more than half of the institutions presented serious structural deficiencies. This situation aligns with previous studies done in Mozambique which point to the urgent need for investment in education. The lack of adequate desks, poor lighting and other school conditions contribute to unattractive environment and precarious learning process.

➤ *The Impact of School Performance of the Students*

Quantitative data indicated a strong association between poor infrastructures and low performance indicators. In schools with more precarious infrastructures, absenteeism and failure rates on evaluations doubled compared to schools with better conditions.

Table 2 – Indicators of School Attendance and Performance

School Conditions	Absenteeism Average	Failure Rate
Critical Infrastructures	18%	22%
Acceptable Infrastructures	9%	11%

These data prove that infrastructure is an important and determining factor in the learning process of the students. when the learning process occurs in a comfortable environment, the level of student motivation grows in order to attend classes, and the effectiveness of the teaching process becomes a daily compromising goal for all.

Hanushek and Woessmann (2015), sustain that infrastructure is an essential factor in ensuring equity and efficiency in the education system. In Mozambique, where expanding access to education has been a priority, the issue of quality inevitably involves also the matter of quality of infrastructures. Furthermore, the results confirm that universal policies for expanding the school network, when is not accompanied by consistent investments in infrastructures, generate contradiction in which more students have access to school, but under conditions that do not offer meaningful learning process.

VI. PERSPECTIVES OF INTERVENTION FOR BETTER QUALITY OF EDUCATION

The results obtained in this research into the school infrastructure problems demonstrated that seriousness of this situation and its direct impact on the quality of education requires a multi dimension approach involving state, local community, international partnership and schools themselves. All these forces are called to work together in order to overcome these challenges basing their actions on the:

- Immediate rehabilitation of schools in critical conditions, in order to ensure the physical safety of the students and teachers, prioritizing this plan on schools in worst conditions. In addition to this, it is necessary to build new classrooms in order to reduce overcrowding and to accommodate those students who are having lessons under trees. This action is essential in building up the quality of education.
- Implementation of sanitation and water supply infrastructure in all schools because the lack of potable water and inadequate sanitation was one of the most serious problems identified during the research and such

conditions compromise the health, dignity and ability of students, especially girls. On the other side, integrating especial programs such as water and sanitation in schools can guarantee funding and technical assistance from different financing partners.

- The creation of community school libraries that can serve not only students, but also teachers and community members. On the other hand, it is necessary to invest in basic pedagogical resources, such as desks, maps and laboratory materials in order to contribute on diversifying teaching methodologies, promoting practical and contextualizing learning.
- Management and maintenance of infrastructures. One of the identified problems was related to the absence of preventive maintenance plan which led many schools into serious damages. In this sense, can be created school infrastructure committees which would undertake responsibilities in monitoring the status of the infrastructures and other kind of facilities for maintenance and mobilizing local resources for basic repairs.
- Permanent training and motivation of teachers. Even though the main issue is about infrastructures, the importance of teachers cannot be ignored. It is necessary to promote a continuing education program that prepare teachers to be in touch with daily teaching challenges, such as innovative methodologies teachings, even taking into consideration the limitations of resources.
- To create motivational incentives, such as school transport, personal subsidies and teachers award in order to stimulate teachers' commitment to improving quality education.
- To promote partnership with different NGOs, the private sector, and international agencies to provide educational resources, directing these funds and investments to the areas of infrastructures or other areas according to priorities. At the same time, public policies must ensure financial sustainability without depending exclusively on the partnership framework.

Besides all above perspectives, the state has responsibility to create a system of continuous monitoring and evaluation of all activities related to the state of infrastructures, the impact of interventions carried out and the evolution of educational indicators in order to be able to adjust strategies reinforcing successful government actions.

VII. CONCLUSION

The present research showed that the lack of school infrastructures conditions in some areas of Quelimane district is one of the main obstacles to promoting quality education. The precarious conditions observed in more than 60% of analyzed schools revealed the seriousness of the problem related to overcrowded classrooms, lack of adequate furnitures, absence of potable water, basic sanitation, shortage of libraries and teaching resources. This deficit of resources affects directly to school and student activities. The impact becomes serious when it is related to girls who face additional constraints due to the lack of adequate toilets and hygiene condition for this group of students which can promote gender inequalities in the education system. Besides

the impact to the students, it was also found that this situation affects also to teachers, especially feeling demotivated because the lack of incentives and working with limited resources which impact on the teaching process. In this context, the study demonstrated that investing in school infrastructures is not just a matter of physical building, but it is also the matter of guaranteeing equity, dignity and real learning opportunities for all. On the other side, investing in school infrastructure is a matter of taking care on the provision of water, sanitation, libraries, promoting inclusive and quality education capable of responding to the demands of human and social development in Mozambique, in especial way in Quelimane district.

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