Expensive Classrooms, Poor Learning

The Imperatives of Reforming School Construction in Egypt

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Alternative Policy Solutions is a non-partisan, public policy research project at The American University in Cairo. Using rigorous, in-depth research and a participatory process of consultations with a diverse range of stakeholders, we propose evidence-based policy solutions to some of the most difficult challenges facing Egypt. Our solutions are innovative, forward-looking and designed to support decision makers' efforts to introduce inclusive public policies.

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Executive Summary

Egyptian schools suffer from systematic deficiencies that affect student learning, attendance, health, and dignity. These include a discrepancy between needs and actual construction projects, very poor maintenance, and massive school shortages leading to high density, overcrowding, and multiple-shift schools. Egypt's average classroom density of 47.5 students/classroom in the primary stage is higher than the average in countries such as India and China. More than 75% of Egyptian students are in classrooms that have over 40 students. Such high classroom densities have a strongly negative impact on learning, especially at the critical primary stage.

Not only does Egypt's high average classroom density obscure large variations across the country, it also hides the problem of multiple-shift schools, where more than one school population uses the same facilities. Only one third of Egyptian public school students attend single-shift schools: the remaining 12.7 million children (of whom 7 million are in the primary stage) have to cope with overcrowded classrooms. They also have a smaller window of learning time and are often deprived of classes considered less essential like arts, music, and physical education. These conditions directly contribute to poor learning and student dropout, as well as seriously undermining equality within the system. These inadequate learning conditions, compounded by sanitary and maintenance problems, disproportionately affect those students who are already disadvantaged.

Official estimates point to the need to construct 250,000 new classrooms at a cost of 130 billion Egyptian pounds (EGP) ($7.3 billion).[1] This massive construction campaign must be guided by a restructuring of Egypt's current school construction system under new parameters that will ensure better quality, lower costs, and less resource waste. School shortages and high construction costs are driven by the way in which the system is designed and managed; restrictive and unnecessary requirements increase construction costs while undermining the allocation of land for schools. Highly centralized procurement procedures contribute to high costs, resource waste, and allegations of corruption plague almost every step of the school construction process.

Whereas some aspects of school construction in Egypt may be unique, many of the problems associated with the system are shared by other countries. Drawing on both the local context and relevant international data, this paper provides a comprehensive analysis of this under-researched topic, suggests alternative indicators that should be used to better enhance school construction efforts, and puts forward six key policy recommendations for reforming

1 Other sources estimate the cost of constructing 200,000 new classrooms at 100 billion Egyptian Pounds.

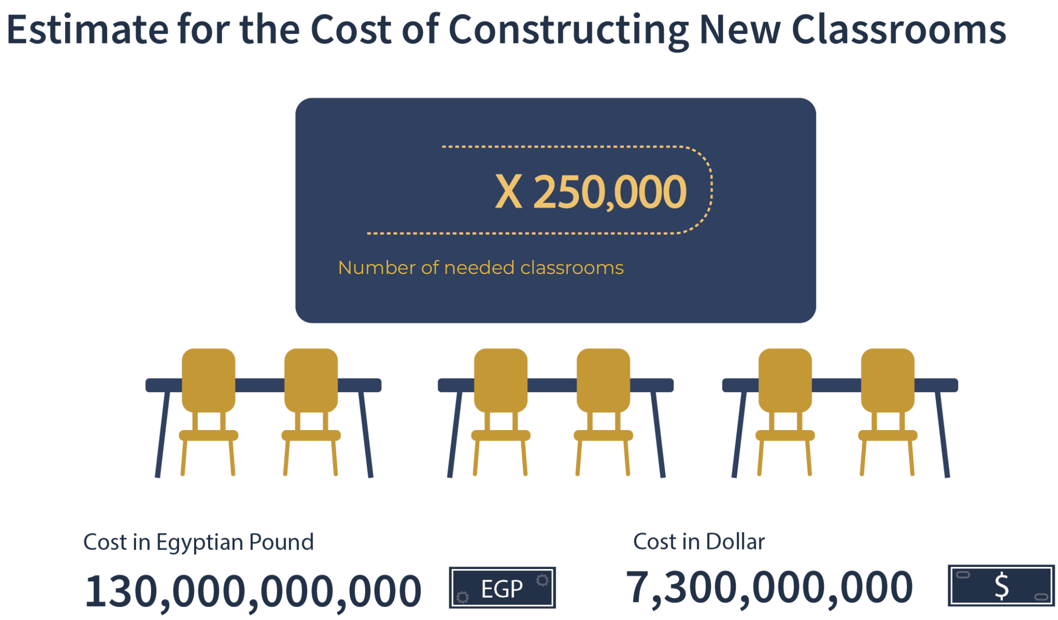

FIGURE (1): Cost of Constructing New Classrooms school construction. The recommendations are all part of a necessary restructuring of the regime of school construction and the main entity responsible for it, the General Authority for Educational Buildings (GAEB).

1. Reduce Costs by Restructuring the GAEB

The GAEB can retain an appropriate coordination and support role as its planning, land purchase, and project management functions are devolved to the local level. This can take place within wide-scale reforms that institute needs-based planning, greater financial transparency, and data availability. Reform of procurement practices and elimination of unnecessary construction requirements, combined with savings from the new minimum standards and from building smaller rural schools, should reduce school construction costs so they are in line with international averages.

2. Base Construction Plans on a New Set of Indicators

In order for school construction efforts to be more evidence-based, needs-based and transparent, a set of new indicators is suggested based on the following priorities: improving sanitation and maintenance, eliminating the multiple-shift system, reducing overcrowding, and reaching students who do not have access to education. These new indicators directly target the number of students (and teachers) affected by the learning conditions that are a direct result of the way schools are constructed.

3. Develop New, Flexible Minimum Standards

The ability to meet the need for new schools will require new standards to be instituted based on consultations with the relevant stakeholders at all levels. The new guidelines should insist on basic health, safety, and educational standards but allow for flexibility on how they are met, while eliminating requirements that are too expensive and unnecessary, such as concrete walls.

4. Reform Financial Regulations and Spend More on Maintenance

The amount of funds allocated to school maintenance, the ease with which schools can use these funds, and the hiring of cleaning and maintenance staff are all areas that require urgent reform. Maintenance and furniture replacement costs should reach the internationally recommended average of 7% of initial investment. Each school should be provided with the appropriate budget for hiring a sufficient number of caretakers and cleaners, and for purchasing the materials necessary for them to perform their tasks.

5. Build Larger Urban Schools and Smaller Rural Schools

The sensible course of action is to build larger urban schools, given the growth of urbanization. For villages with small populations and in areas where populations are dispersed, Egypt needs to catch up with the rest of the world in building smaller, possibly multi-grade schools. These schools also need to be more accessible to children so that they do not walk long distances or on dangerous roads; that is, schools should be within 1 km of student homes.

6. Organize and Support Land Acquisition and Reallocation

Dealing with the issue of land scarcity and allocation is unavoidable. The GAEB's local offices should be tasked with coordinating, facilitating, and supporting local communities in the process of asset acquisition and reallocation for school construction.

1. Introduction

Ensuring that every child has access to the right to education requires an effective and responsive system of school construction. The way in which a country goes about building schools has critical implications for educational quality and equity. Different characteristics of school facilities—from the number of students in a classroom to the availability of quality labs and equipment—play an important role in determining the quality of education and of student-learning outcomes. The nature and sophistication of school facilities can help students develop a range of knowledge, skills, and abilities, from arts to physical activity and from scientific inquiry to civic engagement and communication skills. Moreover, among other important elements that affect the quality of education, school construction has been shown to have a direct impact on the frequency of school attendance.

Starting with the Education for All and Millennium Development Goals at the beginning of the 21st century, Egypt has seen a huge expansion in the number of public schools. For example, between 1992 and 2006, about 14,000 new schools were built in Egypt, mostly by the GAEB (NCERD, 2014). However, expanding access has continued to grow without a real assessment to the situation or how to mitigate the problems facing it. To the best of our knowledge, there is a scarcity of literature examining school construction in Egypt. Major international reports that have analyzed a wide range of issues in Egyptian education provided little detailed analysis on the matter. Although significant international funding has been directed toward building new schools, discussions of how to actually reform the regime of school construction and maintenance are almost nonexistent. One notable example is a recent international study that analyzed the regime of school construction in Egypt from the perspective of its extreme centralization, arguing that decentralization is a key component of the needed reforms (Gershberg, 2014).[2]

School construction in Egypt has contributed to a rapid decline in educational quality and equity, and failed to show the flexibility and innovation required to meet the needs of a rapidly growing population. Paradoxically, while construction regulations insist on a range of rigid and expensive requirements, Egyptian schools systematically suffer from the most basic infrastructure failures. Furthermore, the poor sanitary and learning conditions in schools disproportionately affect those students who are already poor and disadvantaged. Egypt's multiple-shift system, whereby the same school facilities have to be shared by two different schools, dramatically reduces learning time. This system, which affects two thirds of primary school students, also fundamentally undermines students' holistic educational experience by depriving them of educational activities and diverse learning opportunities.

In addition, inefficient spending on school construction uses funds that could be diverted to teacher salaries, training, or other efforts to upgrade quality. Boosting teacher quality is a vital element of educational reform, particularly in Egypt, where teachers are frequently absent because they need to hold down another job to make a living wage, or because they choose not to teach in the classroom so as to pressure students into enrolling in private tutoring. Reforming school construction, and thus boosting funds for other key educational priorities, is imperative, and should be an essential element of any effort toward educational reform in Egypt.

In recent statements, Minister of Education Tarek Shawki said that there is a need to build 250,000 classrooms[3] at a cost of EGP 130 billion to meet the demand for education (AbdelBaset, 2018). Given this planned expansion, a reassessment of the best way to maximize available resources and improve educational outcomes via school construction and renovation is vital. Accordingly, this paper analyzes the key issues relating to public school construction in Egypt, identifies specific potential areas for savings in spending, and proposes concrete measures for reform. It develops new indicators and a set of policy recommendations that would lead to more efficient, needs-based, and evidence-based school

2 Another study examined the effect of current classroom construction on students' learning in Egyptian schools while proposing an approach that integrates school spaces and facilities with related societal spaces and facilities, without drastic change in schools' physical structure (Hegazy, 2012). A different study applies value engineering techniques to educational buildings to maximize the utilization of the available construction and maintenance budget (Youssef, Mohammed, Ibraheem, & Hussein, 2012).

3 Some media reports also quoted figures of 200,000, or 260,000 classrooms.

construction planning. The paper begins by explaining the significance of the issue and the current situation in Egypt. It describes the system of school construction and details the data related to its key problems of high classroom density, overcapacity, reduced learning time, and very high construction costs. The second part of the paper presents the policy recommendations that emerge from this analysis.

1.1. Methodology

Exploring the key issues relating to public school construction in Egypt in order to propose effective policy recommendations for reform, the paper is based on an analysis of the available local and international data, interviews with stakeholders working in schools, and a consultation session held with key stakeholders from the government, various local and international NGOs, and international organizations active in the education sector.

2. Literature Review

The following literature review section highlights the main features of an efficient school construction system. It discusses school infrastructure and the impact of efficient school buildings on teaching and learning, the multiple-shift system and the relationship between learning outcomes and class size, and the governance and centralization of school construction.

2.1. School Infrastructure

School infrastructure has a wide-ranging impact on student learning. First, in reference to school proximity to home, the evidence is overwhelming and unambiguous: schools must be located as close as possible to children's homes. The closer a school is to home, the more likely parents are to send their children to school, and to do so at the appropriate age. Research shows that "the single most important determinant of primary school enrollment is the proximity of a school to primary age children" (Lockeed & Verspoor, 1991). Long distances to school not only increase the opportunity cost of attending school, but also tax the stamina of children, can place them in vulnerable situations, and pose a particu-

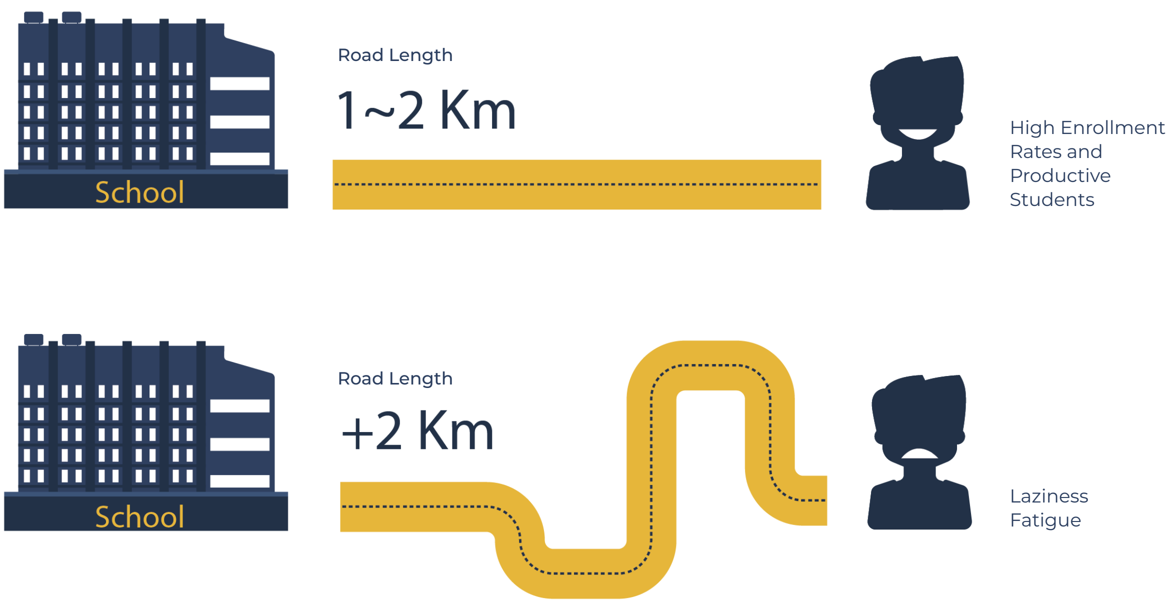

FIGURE (2): The Effect of Distance Between School and Home on Students larly acute barrier for girls to attend school (Kane, 2004). Evidence from other African countries, and from Asia, suggests that enrollment and retention decline significantly beyond a distance of 1-2 Km, or a 30-minute walk, particularly for younger children (Theunynck, 2009). A number of studies show that students living less than 1 Km from their school perform statistically better than those who walk farther, and that improvements in the availability and quality of school infrastructure result in higher primary school enrollment and increases in English and math achievement (Theunynck, 2009, pp. 3–7). Children's school attendance is also strongly linked to the sanitary conditions and the availability of drinking water in schools. In general, maintenance is the single most cost-effective investment a country can make, yet few countries make it a priority and few donors give it much attention (Theunynck, 2009).

As discussed in detail below, there are three other basic pillars in the link between school infrastructure and learning: high classroom densities, classroom overcapacity, and short school days. Beyond these basic pillars, there are, of course, further considerations relating to how facilities can foster students' knowledge, skills, and abilities through advanced technologies and resource-heavy artistic and creative activities. Finally, teachers facing large classrooms are more likely to engage in physical punishment or verbal insults to control students, thereby violating children's dignity and their need for protection from harm (Alyahri & Goodman, 2008).

2.2. Classroom Density and Improved Learning Outcomes

Evidence relating to class size effect on learning outcomes is mixed and has to be approached with a degree of caution. Some studies show that students in classes with high student-to-teacher ratios, up to a threshold of 60 students per class, perform just as well as students in smaller classes, whereas beyond 60 students per class, learning outcomes deteriorate (Theunynck, 2009). According to a report by the OECD, many European countries invested additional resources to decrease class size between the years 2000 and 2009, but student performance improved in only a few of them (OECD, 2012).[4] An effort that leads to decreasing the number of students in most classrooms from 24 to 21 or from 46 to 43 would create little difference in the learning environment, even if this change requires significant investment in building new classrooms and hiring new teachers. However, if the investment in new schools and teachers leads to lowering the density of a significant number of classrooms with the greatest need from 75 to 38, this would represent a rather substantial change in the learning environment. That is, there is a qualitative difference between simple lowering of densities (especially by lowering densities that are already moderate) and targeting the lowering of very high densities in overcapacity classrooms. In fact, research shows that very large class-size reductions, in the order of 7-10 fewer students per class, can have meaningful long-term effects on student achievement and perhaps on non-cognitive outcomes (Whitehurst & Chingos, 2011).

Furthermore, classroom density has different implications for different groups of students. The most promising effects of class-size reductions occur for classes from kindergarten to third grade (Robinson, 1990; Jepsen, 2015). The academic effects seem to be greatest when introduced in the early grades, and for students from less-advantaged family backgrounds. They may also be strongest in classrooms of teachers who are less well-prepared and effective in the classroom (Whitehurst & Chingos, 2011). In fact, a student–teacher ratio of 40:1 has been used by the World Bank since the Education for All (EFA) initiative because this ratio is observed in the highest-performing countries (Mingat, Rakotomalala, & Tan, 2002). This means that in a country like Egypt, where education quality has declined so extensively, it would make sense to aim for large class-size reductions and not exceed a maximum of 40 students per classroom. Finally, the dominant pedagogical model of student-centered learning, and the kinds of skills it implies, would necessarily require lower

4 Based on this evidence, it is clear that reducing class size is not, on its own, a sufficient policy lever to improve the performance of education systems, and is a less efficient measure than increasing the quality of teaching. This analysis from the OECD is especially true when comparing advanced education systems like Germany and Japan and noting, for example, that higher densities in Japan do not undermine learning.

classroom densities. If Egypt really wants to apply student-centered learning, as per the latest reforms, it has to set even lower density figures as policy goals and invest the resources needed to meet these goals.

Moreover, classroom arrangement indirectly affects both student and teacher performance in the teaching and learning process. In order to implement various classroom arrangements, there has to be enough space in the classroom to enable movement, interaction, and creativity. Various learning activities in the classroom help improve teaching and learning quality, enhance students' participation in learning, and increase their performance both in academics and discipline (Ramli, Ahmad, Mohd Taib, & Masri, 2014). Although, with some creativity and pedagogical skills, teachers can handle big classrooms, the physical size of the classroom compared to the number of students in that class plays a vital role. Teachers facing large classrooms are under a lot of pressure to complete the curriculum while also teaching 21st century skills, all in a very short time and with a large number of students. This may lead teachers to engage in physical punishment or verbal insults to control students (Alyahri & Goodman, 2008).

2.3. Multiple-Shift Schools

The issue of school construction is not only one of classroom density and overcrowding, but of the number of hours that children study and the inequalities therein. In an analysis of learning outcomes across 21 African countries, the existence of double shifts at schools is shown to have a strong negative impact on student achievement due to the reduced number of hours that double-shift students spend in school relative to their single-shift peers. This result appears in countries such as Madagascar, which (like Egypt) operates each shift with separate teachers, as well as in Senegal, where one teacher teaches both shifts (Michaelowa & Wechtler, 2006). The difference in learning time between single-shift and double-shift students can be enormous, such as in the case of Burundi, where single-shift students receive twice as many instructional hours as their double-shift peers (Rakotomalala et al., 2007).

2.4. Centralization and Transparency in the Management of School Construction

Centralization offers some benefits, among them a uniformity of management. It also improves coordination because of the unity of command (Caldwell, 2009). However, experience also shows that a centralized approach results in numerous inefficiencies (Theunynck, 2009). First, as summarized by Theunynck, it often results in inappropriate decisions on school size and location, because education ministries tend to apply norms mechanically, treat school mapping as a static desk exercise, use poor and outdated information, fail to consult with communities, and use staff that are often insufficiently qualified—generally, former teachers with only short-term training in education planning. Second, it lacks transparency, as decision-making criteria are not well known outside the education ministry and allocation decisions can be more easily influenced by political intentions than relative need. As a result of these flaws, it should not be a surprise to find schools that are inappropriately located, sometimes in the middle of nowhere; schools that are under- or oversized; and some populations that are better served than others (Theunynck, 2009).

Another factor linked with centralization that may be driving high costs is corruption. The construction sector consistently ranks as the most corrupt of any segment of national economies in surveys across countries (Transparency International, 2002). In France, major construction enterprises were convicted in 2006 of using bribes to obtain public contracts for school construction and transportation. In New York City, past corruption in school construction is measured in the hundreds of millions of dollars (Klitgaard, Abaroa, & Parris, 2000). The existence of large contracts (which often comes with centralization) may itself inflate costs and reduce quality (Theunynck, 2009). Along with smaller procurement packages and multiple suppliers, however, comes a need for greater management capacity to effectively manage the larger contract volume.

Decentralization in most developing countries is interpreted in three complementary ways: asking elected local authorities to take charge of education in their area, strengthening the role of regional and district education offices, and/or increasing school autonomy in resource management. Some of the advantages of decentralization are that parents and communities show greater commitment to their children's schooling. When they have a sense of autonomy, teachers, inspectors, and school management are committed to the implementation plans (International Institute for Educational Planning [IIEP], 2004). However, there are hurdles and disadvantages to decentralization. For example, one of the problems identified during the IIEP's research on decentralization policies in West Africa was poor quality-monitoring on the part of local education offices, owing to the inadequacy of the financial, material, and human resources at their disposal (International Institute for Educational Planning, 2004). Moreover, school principals suffer from work overload that might affect the efficiency of the decentralization process. Hence, the rise in the number of students entails a similar increase in the teaching and administration work force. There can also be cultural obstacles to the implementation of a decentralization policy. These policies mandate considerable changes in the structure of the education system and in the division of responsibilities.

One of the functions that is typically decentralized and often delegated to NGOs or other agencies is the management of construction contracts. A 2003 review by the World Bank encouraged reliance on NGOs for school construction in order to reduce costs (Theunynck, 2003). NGOs can mobilize additional resources and generate innovative solutions to local problems. In 2000, the unit cost of a classroom in Guinea decreased from $13,500 to $7,600 through reliance on NGOs. Social funds and contract management agencies (CMAs) are also excellent mechanisms for building schools, provided there is participative community involvement (Theunynck, 2003). Finally, a model that has sometimes been seen as desirable is using local materials and abandoning cement-rich modern construction methods. However, based on research into previous attempts to use local materials, prefab schools, and other innovations, the current consensus is that simple modern technology works best, along with modest architectural standards and a minimum durability of 25 years (Theunynck, 2003).[5]

5 In most cases, the average cost of the classrooms built using local materials is more than twice the cost of a classic classroom constructed by the formal or informal sectors, using modern technology based on cement-walling and modern roofing (Theunynck, 2009).

3. Policy Context in Egypt

About 19.2 million students were enrolled in Egypt's approximately 46,000 public schools in the 2017-2018 school year, with 10.5 million of them in the primary stage (Ministry of Education, 2018). The average class size in the primary stage is 47.5 students per classroom, while the national average for all grades is 44. The GAEB, an agency that operates under the Ministry of Education but is independent of it, is responsible for educational construction projects in Egypt (see appendix 1). It has a significant and growing share of the total budget allocated to the ministry: its share of the 2018-2019 budget was EGP 7.3 billion, compared to EGP 5.5 billion in 2017-2018.

The GAEB has made significant achievements over the past few decades, the biggest of which occurred in the period after the major earthquake that hit Cairo in 1992.[6] Between 1992 and 2006, about 14,000 new schools were built, mostly by the GAEB, greatly expanding access to and enrollment in basic education. In recent years, the GAEB has embarked on renovation programs focused on repairing the construction and maintenance problems in public school buildings and making them safe for students (Ibrahim, 2017). As shown in table (1), the number of projects carried out by the GAEB has been rapidly increasing. The number of completed projects almost doubled from 2016-2017 to 2017-2018. However, as detailed in table (2), only about one third of the classrooms built (16,622 of 46,436) were new classrooms in new schools.[7]

6 The 5.2 magnitude earthquake took place on 12 October 1992; thousands of buildings were damaged and several hundred completely destroyed.

7 The construction projects listed above also include administration buildings (teachers' rooms, offices, clinics, etc.) and service areas (toilets, canteens, storage rooms, etc.). They also include the construction of new schools on new land, the total replacement of dilapidated schools, the partial replacement of existing schools with the purpose of renovation and enhancing capacity, or horizontal/vertical expansion of existing schools.

TABLE (1): Number of Classrooms Constructed Over the Past Five Years

Fiscal Year	Number of Construction Projects	Number of Classrooms Built
2014-2015	485	6,414
2015-2016	588	8,619
2016-2017	707	10,314
2017-2018	1,308	19,277
2018-2019 (until August 2018)	120	1,812

Source: General Authority for Educational Buildings, 2018.

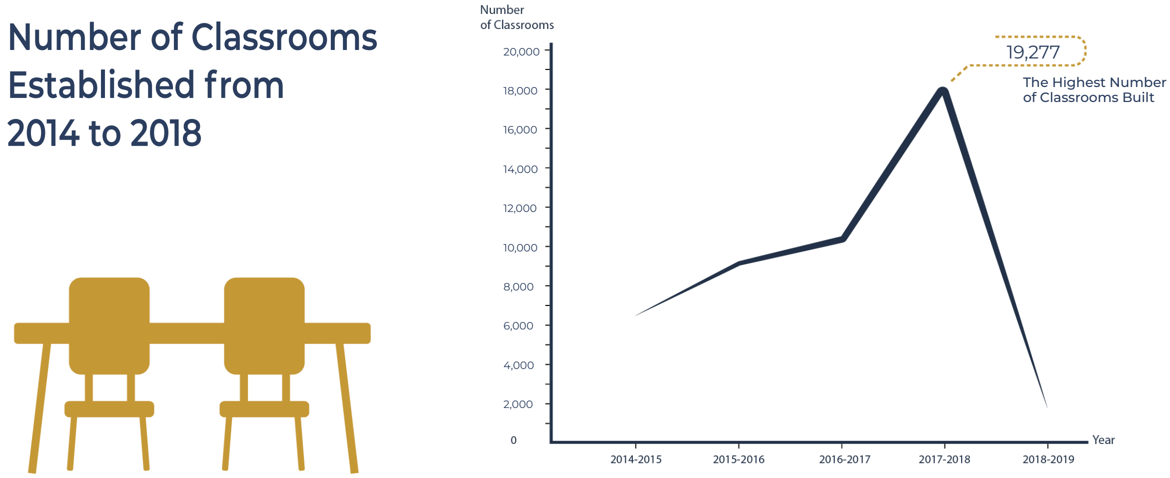

FIGURE (3): Number of Classrooms Built in the Past Five Years

Source: General Authority for Educational Buildings, 2018.

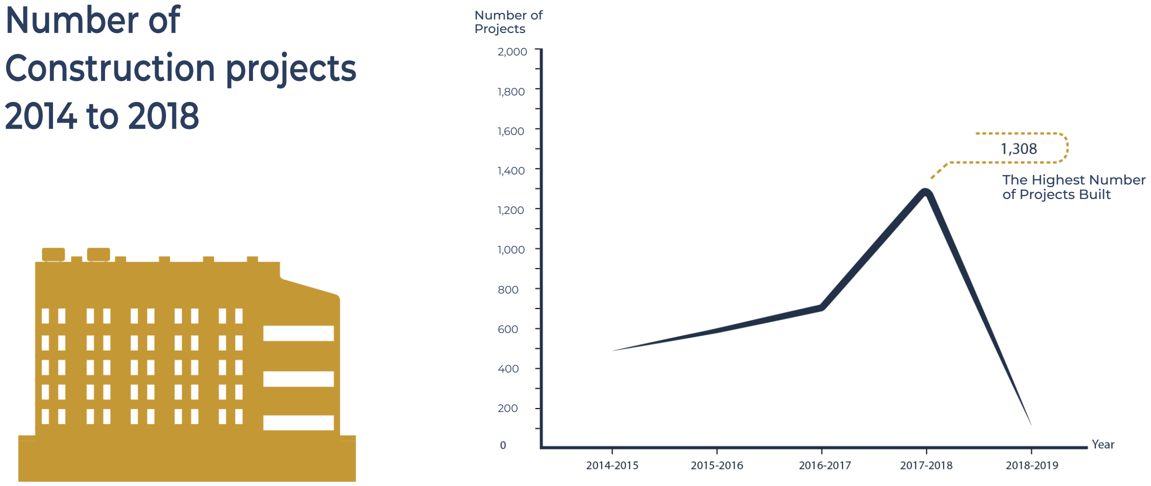

FIGURE (4): Number of Projects Constructed Over the Past Five Years

Source: General Authority for Educational Buildings, 2018.

TABLE (2): Construction Projects Over the Past Five Years

Type of Construction		Number of Construction Projects (% of all projects)	Number of Classrooms Built (% of all classrooms)
New Construction	Building new schools on new land	982 (30.6%)	16,622 (35.80%)
	Total replacement of dilapidated schools	504 (15.71%)	7,302 (15.72%)
Improving the Capacity of Existing Buildings	Partial replacement of existing schools with the purpose of renovation and enhancing capacity	563 (17.55%)	8,504 (18.31%)
	Horizontal expansion of existing schools	987 (30.77%)	12,791 (27.55%)
	Vertical expansion of existing schools	172 (5.36%)	1,217 (2.62%)
Total		3,208	46,436

Source: General Authority for Educational Buildings, 2018.

3.1. Challenges of Efficient School Construction in Egypt

School construction problems in Egypt are typical of most developing countries, and include issues caused by a mismatch between construction needs and the actual construction projects implemented. These problems include school shortages leading to high densities, overcrowding and multiple-shift schools. Such problems are further compounded by the poor sanitation and inadequate building maintenance.

3.1.1. Institutional Issues

The GAEB is responsible for all issues related to the centralized planning, land allocation, development of technical specifications, procurement, contracting, project management, among others (see appendix 1). These complex nationwide duties limit the agency's capacity to manage the construction projects, and contribute to the problems of low quality, high costs, and resource waste that affect Egyptian schools. Both media reports and interviews conducted for this paper have highlighted the deficient quality of some educational buildings, examples of failures to complete infrastructure to contracted standards, and reports of systematic waste.[8]

The GAEB identifies the needs of schools through its own information system and its regional offices in each governorate; accordingly, it determines the needed capital investment. However, when deciding where schools should be built, GAEB does not perform social impact assessments or a cost-benefit analysis. Instead, it relies on the reports submitted by its local bureaus in different governorates. One of the major results has been the construction of schools where they were not needed but where the price of land was low or could be acquired for free (Tawfik, 2018). As a result, schools are built in places where existing population densities do not require them, and crowded schools are left as they are (Gershberg, 2014).[9]

According to a press conference by the education minister on September 28, 2018, the current cost of classroom construction ranges from EGP 500,000 to EGP 1 million, and the government requires 250,000 extra classrooms, at a total cost of EGP 130 billion (Yehia, 2018).[10] Based on the exchange rate with the U.S. dollar in November 2018, the current cost of school construction is very expensive, around $28,026 per classroom.[11] According to one report, there are lower-cost models for school construction in Egypt itself, including Al-Azhar schools, which are about 33% less expensive, and NGO-built CARE schools, which are about 22% less costly according to 2005 data (Gershberg, 2014).[12]

There are three likely reasons for the high cost of school construction: expensive requirements, centralized procurement practices, and alleged corruption. The requirements for schools are described below, but further requirements exist and should be included in publicly available documents. For example, costly items such as a concrete walls and iron gates are required for construction. However, their typical costs are not made publicly available. The GAEB also sets special requirements relating to earthquake risks. Although the 1992 earthquake did damage some school infrastructure, Egypt does not have a high risk of earthquakes, and most of the interviewed stakeholders argue that the regulations have been set too high. These requirements both increase the costs of construction and limit the possibilities for building on land that has not passed the highest levels of earthquake risk assessment.

The GAEB builds schools based on an approved budget and a projected number of schools that are needed yearly. However, there are always delays in every construction project, leading to serious consequences such as rescheduling or cancellation (Kholif, 2015). Furthermore, the auditing process for the invoices is fairly weak, and there is no entity responsible for the supervision and evaluation of the GAEB, leading to incidents of corruption. Significant savings could be made if there was a closer inspection of works in prog-

8 For examples of media coverage, see Sobhi (2013) and Abdel-Samie (2016).

9 More information about the land allocation can be found in the section "School Location."

10 In other statements he has said that 200,000 or 260,000 classrooms are needed.

11 To the best of our knowledge, there is no recent international data that would allow us to compare the average cost of classroom construction in different countries; the only available figures are from 2003. Those figures show that costs were about $7,000 per classroom in Africa, $8,000 per classroom in Latin America, and $4,000 per classroom in Asia (Theunynck, 2003).

12 The GAEB claims that the Al-Azhar schools are of lower quality, particularly with respect to earthquake risk, an assertion that is hard to refute in the absence of major earthquakes in recent years (Gershberg, 2014).

ress and their corresponding invoices. In addition, limited information is available about these auditing requirements and the costs of implementing them.

Second, in terms of the GAEB's procurement procedures, centralization and the use of large contracts are arguably a factor in the high costs. Although progress has been exceedingly slow, decentralizing some GAEB functions has been part of the government's reform agenda. A few capital investment and maintenance responsibilities have indeed been transferred to the regional (governorate) level of the education ministry and/or the GAEB (Gershberg, 2014). However, as detailed in the subsequent discussion on infrastructure maintenance, this measure was not accompanied by sufficient resources, training, or realignment of incentives, so as to make it contribute to improving school infrastructure.

The third factor that is likely driving the high costs (and low quality) is corruption. There is a widespread perception of the existence of multiple layers of commissions and sub-contracting that are subject to systematic corruption. Allegations of corrupt practices are regularly covered by the media and have included serious price inflation in construction contracts (e.g. steel prices set far higher than market prices), issues with land allocation, informally imposed payoffs, and other irregularities (Sobhi, 2013; Fawaz, 2017; and Rady, 2018). At one point in 2010, it was the education minister who led the anti-corruption rhetoric, albeit with almost no tangible results (Bakry & Al-Qadi, 2010).

3.1.2. Maintenance

Once a building is completed and furnished, the GAEB delivers it to the education ministry. Periodic intervention for emergency building repairs is undertaken by the GAEB, while casual maintenance is conducted at the school level. A recent study has detailed the serious weaknesses relating to school maintenance in Egypt, especially in terms of the limited number of workers and insufficient maintenance budgets (Ibrahim, 2017). As per the interviews, both cleaning and routine maintenance suffer from severe understaffing; however, better data is needed to adequately analyze this issue. The hiring process for cleaning staff is also unclear. Most cleaning staff in schools are reportedly hired on irregular contracts for low wages, which they accept because the schools allow them to make money by selling food to students or performing other informally paid tasks. Unfortunately, data on numbers of schools requiring substantial maintenance are not publicly available. However, according to one official statement in 2016, it was reported that 13,000 schools required comprehensive maintenance (Hassan, 2016).

Current financial regulations seem to be a key impediment to smooth and efficient school maintenance. Although there has been progress in the decentralization of regulations that allow school maintenance to be approved at the local level, its impact has been reversed by restrictive financial regulations. While the maintenance funds for each school can be accessed without approval from the central administration at the education ministry, any surplus in these maintenance accounts is returned to the Ministry of Finance with significant payoffs for intermediate administrative staff, as indicated by a number of stakeholders interviewed for this report. This creates an incentive for responsible staff to block and complicate this disbursement. They reportedly resort to different tactics such as creating delays in processing and insisting on overly bureaucratic requirements. Furthermore, by maintaining ambiguity about the correct procedures, school authorities are left to operate under constant fear of investigation for financial wrongdoing if rules are violated. The result is that many schools abandon their maintenance plans or resort to collecting funds from parents instead of using the funds allocated to them. Although accurate figures are not available, most maintenance funds are reportedly unused, despite the need for regular or urgent maintenance in almost all schools.

3.1.3. School Location

This section explains the shortage in schools, the restrictive criteria used by the GAEB, and the mismatch between completed projects and actual needs. According to the education ministry's 2014-2030 strategy, the main problem facing the GAEB is the availability of suitable land to build more schools, given the country's population distribution and density, with most of the population settled on only 7% of the country's total area (Ministry of Education, 2014).[13]

Land prices in densely populated areas are very high in light of the restricted criteria by which the GAEB has to abide when choosing school locations.[14]

The president, prime minister and governorates can allocate land to the education ministry, and the ministry's ownership of the land comes in seven different forms, including: free allocation of lands, donations, expropriation, transfer of utility to public property, expropriation only, and state land with private ownership (Tawfik, 2018).[15] The GAEB's detailed budget is not publicly available and therefore there is little information readily available on land purchases (Tawfik, 2018). Most of the new land allocated for the construction of public schools comes either in the form of donations from private citizens, or is land allocated in the new cities being constructed by the state (Tawfik, 2018).

While more detailed data are needed, the available information does not show a clear link between the need for school construction and the construction projects that were actually completed. Appendix (4) shows the number of projects that were launched over the past five years, arranged by the number of classrooms built in each governorate. It is not easy, however, to see how construction projects correspond to needs. For example, given that Giza governorate has the highest classroom density, one might expect more classes to be built in Giza. However, Sharqiya governorate had the highest share. More details about the breakdown of the projects (e.g. how many are new classrooms) would also offer evidence as to how well the projects correspond to the needs of the communities. For example, there were 50 new projects in South Sinai that yielded 450 classrooms, while only 20 projects were completed in Port Said, but they resulted in 310 classrooms.

As mentioned above, one of the major issues has been the construction of schools where they were not needed because the price of land was low, or it could be acquired for free. This has led to the construction of schools where existing density did not demand it, while crowded schools have not been remedied (Gershberg, 2014). Almost by definition, jurisdictions with cheaper land tended to be those where schools were not as overcrowded. Moreover, not only does the land problem affect crowded urban neighborhoods, it also affects rural ones. An estimated 9,734 villages are deprived of basic education (i.e. primary and preparatory education), that is, around 23% of the total number of villages in Egypt.[16] These figures might seem counterintuitive given the high enrollment rates discussed above. However, the fact that the nearest school to a student is in the next village can impact frequency of attendance, fatigue, and learning, while not necessarily affecting official enrollment figures. Community-based education (CBE) schools represent a global trend aimed at meeting the demand for education in small or isolated villages and has been attempted in Egypt since 1994 (Zaalouk, 2004). However, Ray Lansgten's 2016 study found that the experience of community schools in Egypt has not met the needs of small hamlets,[17] does not provide high-quality education, and needs to be re-examined. It remains a small part of the system where most schools are built based on GAEB models.

3.1.4. Classroom Density

The average classroom density in Egypt is 47.5 students per classroom in primary stage, over 32 in pre-primary and over 40 in secondary stage, with large variations across governorates and districts (Ministry of Education, 2018, chap. 5).[18] This makes

13 According to one estimate, there will be 856,000 additional enrollments at the primary stage over the decade 2015-25, 695,000 additional enrollments at the preparatory stage, and 500,000 at the secondary stage (OECD, 2015, p. 204).

14 More on the restrictive criteria can be found in the section titled Restrictive but Inconsistently Applied Criteria below.

15 As per decree no. 163 of 2016, there is collaboration between the education ministry, the agriculture ministry, and the local units to determine the validity of donated agricultural land for the establishment of educational projects.

16 Those deprived areas can be divided as follows (General Authority for Educational Building, 2018):

1. Areas that have a population of children of primary school age numbering 60 to 240 individuals; there are around 7,410 areas that meet this criteria, or around 17.5% of the total number of villages.
2. Areas that have a population of children of primary school age numbering more than 240 individuals; there are around 2,324 areas that meet this criteria, or around 5.5% of the total number of villages.

17 Langsten explains that: "(1) in all villages, most CBE schools are located in the mother village, often close to government schools; and (2) in one village with several CBE schools there is a large, isolated hamlet that remains without adequate primary school access" (Langsten, 2016, p. 464).

18 If most GAEB classes are designed to hold about 40 students, as per ministerial decree no. 148 of 2000, and if the total number of students in 2017-2018 is 21,441,404 while the number of students who are in classrooms with more than 40 students per class is 16,284,759, this means that 75.95% of students are in classrooms with more than 40 students (see Ministry of Education, 2018, chap. 5).

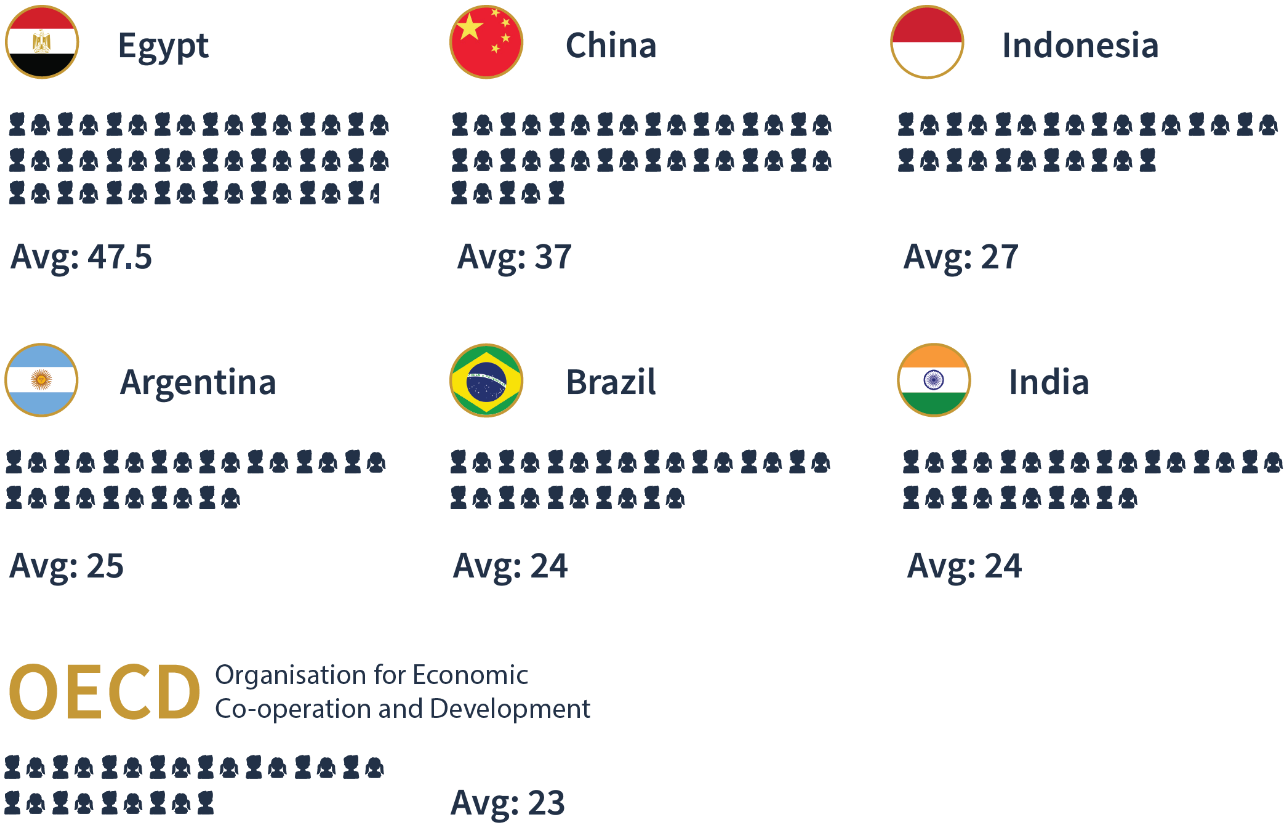

FIGURE (5): Average Classroom Density in Primary Schools in Global Perspective

Source: Figures for Brazil are from the OECD (2018), China and India are from the OECD (2017), and Indonesia, Argentina, and the OECD average are from the OECD (2012). The figure for Egypt is from the Ministry of Education (2018).

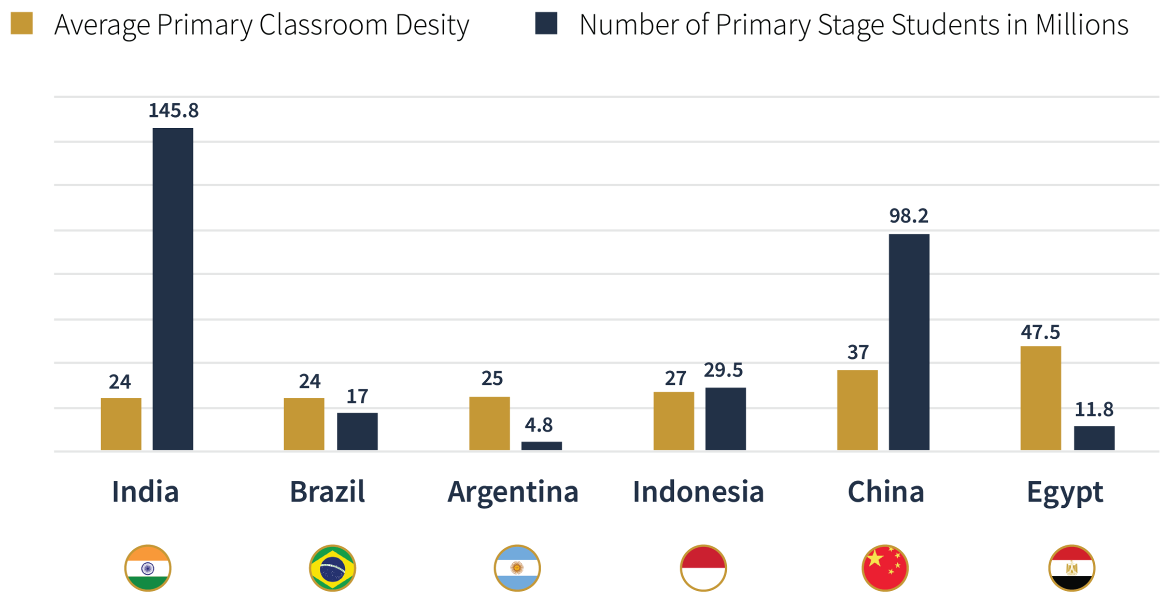

FIGURE (6): Average Classroom Density and Numbers of Primary Students in Global Perspective
Source: Global figures from UNESCO and General Authority for Educational Buildings (2018).

the average classroom density in primary education in Egypt higher than most countries in Asia and Latin America, as shown below in figure (1). For example, average primary school densities in countries with large populations like Brazil, Indonesia, India, and China are far lower than in Egypt. Figure (2) shows the average primary classroom densities compared to the number of students in selected countries. It illustrates that a number of densely populated countries have far lower classroom densities than Egypt.

3.1.5. Overcrowding and Multiple-Shift Schools

The problem of density in Egypt is not only one of large classes, but it is also an issue of physically overcrowded classrooms that were designed for a smaller number of students. Based on the data in figure (7), at least 40% of all Egyptian classrooms are overcrowded. Confining 55 students to the space and seating arrangements for 40 students also impedes their learning, their right to ventilation, and the possibility of movement within the classroom.

Mitigating this situation, the Ministry of Education has attempted to cope with high classroom densities by establishing multiple-shift schools, where two or three school populations use the same facility. A total number of 7 million primary-stage students used the same building at different times of the day in 2017-2018.

In 2017, only 34% of primary-stage public school students were enrolled in full-day schools (Ministry of Education, 2018, chap. 5) while the rest were enrolled in morning-shift, evening-shift, or double-shift schools (figure 8). In a multiple-shift system, the already crammed curriculum must be covered in even less time. Shift schools officially operate for 4-5 hours/day, but often less in practice, with children and staff in many schools reportedly arriving around 7 AM and leaving by 10 AM. This allows very little opportunity for either teachers to teach or students to learn. In addition, most activity classes and subjects considered less essential are eliminated from the schedule, including arts, sports, and music. This means that not only is learning time in key subjects reduced by at least one third, but it also implies that different learning opportunities that are offered to the children's counterparts are eliminated, making the schooling experience even poorer and less holistic. Furthermore, in addition to its poor learning outcomes, this system widens the gap in the equitable access to education where, in 2012, 35% of dropouts were from shift-schools (Elbadawy 2014, p. 12).

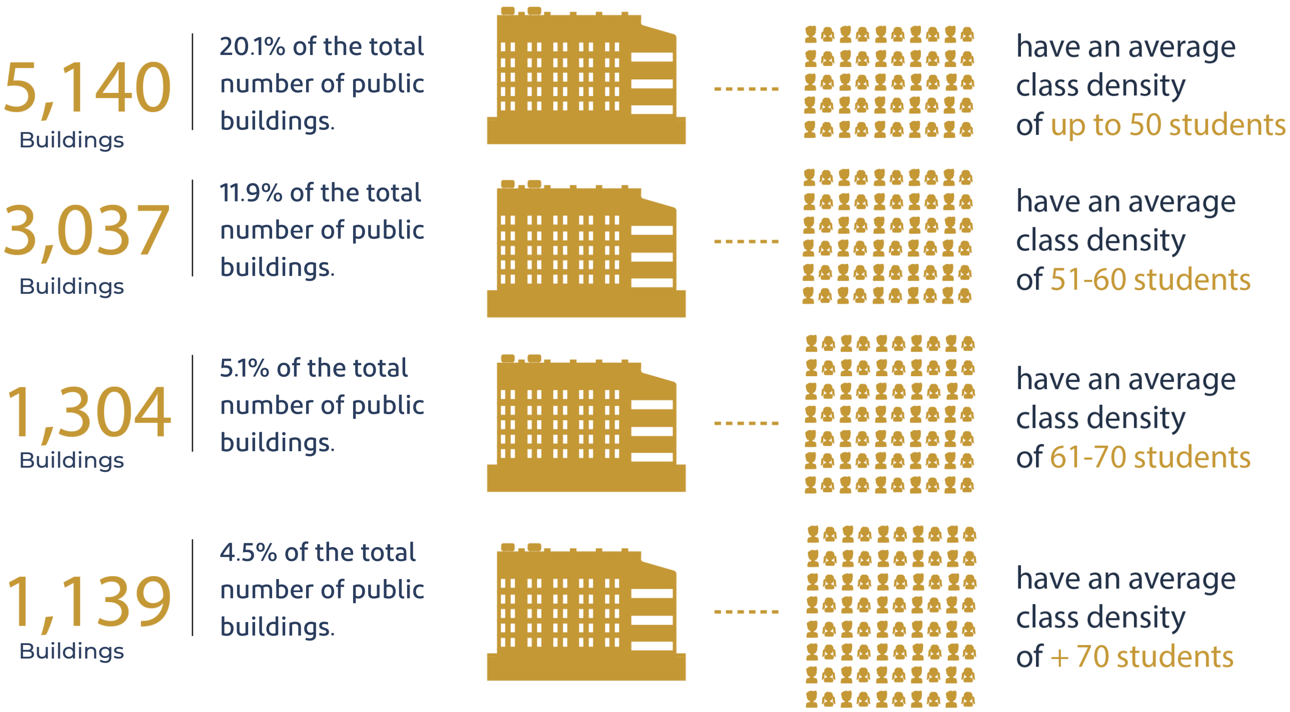

FIGURE (7): Buildings and Class Density

Source: General Authority for Educational Buildings, 2018.

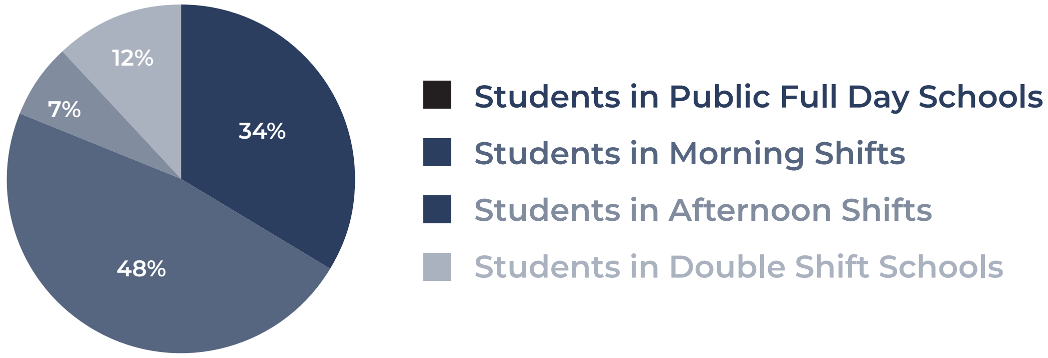

FIGURE (8): Primary Stage Enrollment in Shift and Full-Day Public Schools

Source: Ministry of Education, 2018.

3.1.6. Restrictive but Inconsistently Applied Criteria

Although there are four design models for school construction in Egypt,[19] the "Typical Model" (*al-namuthaj al-namaty*) is used in most of the country. Unfortunately, it does not differentiate in design between urban and rural areas, high population density and remote areas, or high-risk earthquake zones and low-risk zones (Gershberg, 2014). Even though they are not consistently applied, there is a host of restrictive criteria that go with this predominant model. Appendix (2) shows some of the requirements in all basic education schools built on the Typical Model. In addition to these requirements, there are further costly specifications, including a concrete wall around the school and at least two iron gates. There are also highly limiting criteria for which plots of land can be used for school construction in existing cities and villages. For example, the guidelines state that one side of the plot of land should be on a two-way main street connected to other streets, with a length of 6 m^2. Also, in cases where the land is rectangular and not square, the width-to-length ratio should be 1:3, with the shortest side not less than 25 m^2 (General Authority for Educational Buildings, 2011). In light of the scarcity of land plots mentioned earlier, these restrictive criteria often mean that no land plot is suitable for expanding existing schools and building new ones. However, it is not clear whether these criteria are actually applied. The interviewed stakeholders found it difficult to identify the criteria that actually apply to their schools, and they do not see these tables of criteria serving as a means of accountability. Furthermore, the GAEB sets special requirements relating to earthquake risks. Although the 1992 earthquake did damage some school infrastructure, Egypt does not have a high risk of earthquakes, and most stakeholders argue that the requirements have been set too high. These regulations both increase the cost of construction as well as limit the possibilities for building on land that have not passed the highest levels of earthquake risk assessment. Again, these restrictive criteria often mean that no plot is suitable for expanding school construction in crowded urban centers or on agricultural land. Vertical expansion is also a limited option; the maximum number of floors in the Typical Model is four, but a number of stakeholders have reported that in recent years the GAEB has only been building two-floor schools, with less capacity to accommodate students as a result.

Finally, while some improvements, such as including larger playgrounds, have been made to school regulations in newly built urban settlements, this creates inequalities between the pupils attending these schools and the majority of students, who are in schools in established cities and villages. Students in older schools are faced with smaller campuses, higher density classrooms, the same number of facilities, and attend schools operating with 20% more students than their capacity (GAEB, 2011). In new urban communities, school size and student's share of space (2,500 m^2, 8 m^2 respectively) are almost double that of schools in existing cities and villages (1,200 m^2, 4 m^2 respectively). Appendix (3) shows the different criteria for a basic education school in new urban communities compared with established settlements.

19 The Technical Education Model uses the Typical Model school, but also includes technical workshops. The Access Model (namuthaj al-itaha) was developed for use in small villages with low densities. This model is flexible and does not adhere to the normal standards for regular schools. Unfortunately, the model has not been widely used. Finally, "unique models" (el namathej al farida) vary based on the nature of the school (experimental schools/ STEM schools/ Talented Schools/ Japanese etc.). They may include stadiums, playgrounds, restaurants, kitchens, and/or advanced laboratories.

4. Policy Recommendations

This section proposes a set of measures to tackle the issues identified in the preceding analysis. These measures should collectively reduce resource waste, bring down school construction costs, raise the quality of infrastructure, and contribute to better learning and access to education. The policies include:

1. Reduce Costs by Restructuring the GAEB.
2. Base Construction Plans on a New Set of Indicators.
3. Develop New, Flexible Minimum Standards.
4. Reform Financial Regulations and Spend More on Maintenance.
5. Build Larger Urban Schools and Smaller Rural Schools.
6. Organize and Support Land Acquisition and Reallocation.

4.1. Reduce Costs by Restructuring the GAEB

The future success of school construction in Egypt depends on improving the quality and suitability of school infrastructure. Ultimately, this can only be accomplished if there is a comprehensive restructuring of the GAEB to give it an appropriate coordination and support role, while transferring its planning, land purchase, and project management functions to the local level. This should take place within wide-scale reforms instituting needs-based planning, greater financial transparency, and data availability.

A first step toward this restructuring would be to institute a comprehensive independent review of costs and procurement procedures. This review should include an assessment of the GAEB's experience in decentralizing maintenance costs so that the lessons learned can be used to design an evidence-based model for decentralizing other school construction functions. The exact measures for transferring functions to the local level and the speed with which such transfers are conducted should all be developed by this independent review process. For example, international experience shows that reliance on local contract management agencies and NGOs can be successful when accompanied by effective participation of members of the local community. In the case of Egypt, the review of the GAEB might also suggest a role for Boards of Trustees at the governorate or district level, or other bodies that are representative of communities. While such a review should be aimed at developing a concrete plan for a comprehensive restructuring of the GAEB, the review should at the very least be empowered to develop new guidelines for areas where costs should be cut, especially obvious items such as concrete walls, iron gates, and exaggerated earthquake risk requirements, and should outline the new transparent procurement and oversight procedures to be put in place.

Experience has shown that smaller and less-centralized procurement contracts reduce costs and minimize opportunities for corruption. The GAEB already has some infrastructure for setting up new working relationships at the local level, as it already has branches in every governorate. These branches would be transformed into units that coordinate and support the work of various local actors in acquiring land and the construction and maintenance of schools. Because of the huge volume of classrooms that Egypt needs in the coming years, it is not realistic to expect the GAEB to have the capacity to manage and carry out all these construction projects.

4.2. Base Construction Plans on a New Set of Indicators

School construction accomplishments and plans should not be presented as they are now in terms of the number of projects completed per year, but rather in terms of how they have met targets specified in terms of measurable goals. Insights gained from research on classroom density and school facilities must be translated into measurable indicators that go beyond a simple national average classroom density. Above all, Egypt and other countries in the same position should use and proactively target measures that focus on the number of students affected. In order for school construction efforts in Egypt to be more evidence-based, needs-based, and transparent, new indicators and more concrete goals should be adopted based on clear priorities. To better target access, quality, and equity, these priorities are: sanitation/maintenance, the elimination of the multiple-shift system, reducing overcrowding, and reaching students who do not have access to education. Suggested indicators that correspond to the three goals of improving learning conditions, maintenance, and access to schools include:

- Number (or percentage) of students in multiple-shift schools.
- Number (or percentage) of students in overcrowded classrooms.
- Number (or percentage) of students in classrooms with over 40 students.
    - Number (or percentage) of students from kindergarten to third grade in classrooms with over 30 students.
    - Number (or percentage) of students in disadvantaged areas in classrooms with over 30 students.
- Number (or percentage) of students in schools suffering from poor sanitation conditions.
- Number (or percentage) of students in schools that require moderate to serious building repairs.
- Students who do not have a primary school within 1 km of their home.

For greater demonstration of impact, the GAEB could also publish indicators that reflect the numbers of teachers affected by the same conditions. Directly targeting the reduction of these numbers should have large and measurable effects on student attendance and learning, in addition to taking into account equity dimensions of school construction interventions. These suggested indicators are also easy to set up based on existing data. The final specification and phasing of these measures should be agreed upon jointly by pedagogical experts, school construction researchers, and GAEB experts, who may produce additional indicators or modifications to those that have been suggested.[20]

20 For example, intermediate goals might be put in place for achieving these results over a number of phases, while the material and human resources needed are secured (building schools, as well as hiring and training teachers). Different experts would likely offer important insights on how to phase and sequence the process and secure the necessary resources.

4.3. Develop New, Flexible Minimum Standards

The official view, reflected in GAEB guidelines, is that all students should enjoy the same facilities. However, the current system provides highly unequal access to classroom space, school facilities, basic sanitary requirements, and advanced labs and equipment. Even if the regulations look identical in some official documents, these official accounts remain incomplete, and actors working on the ground often have difficulty identifying the infrastructure guidelines applicable to any particular school. The ability to meet the need for new schools will require the institution of new regulations based on consultations with the relevant stakeholders at all levels. The new guidelines should insist on basic health, safety, and educational standards, but allow for flexibility on how to meet them, while eliminating requirements that are too expensive but unnecessary (such as concrete walls around the building). For example, strict minimum standards for sanitation and potable water must be put in place, but different districts and schools should be able to choose different technologies to comply in various ways with these standards. A sanitary model where trucks clear trenches on a weekly basis, or where septic tanks are used, can work in areas where this system is already applied in the district, but will not be suitable for a district where this is not part of local practice, know-how, or resources. Other minimum standards in the literature include: the distance from school to home must be under 2 km at maximum, the number of classrooms should be determined by the actual population size in each area, and the classroom size should allocate at least 1.4 m^2 per student, to accommodate a resource corner and the management of multiple grades within the same classroom (Theunynck, 2009). Furthermore, all new construction should be fully accessible to all school users with disabilities. Considering that one standard model will not suit all circumstances, the GAEB should provide guidelines and a menu of possible models (for construction, furnishing, and maintenance) as well as the flexibility to introduce more alternatives, rather than requiring the application of the same norms across all communities. The idea is that there should be minimum regulations applied to all schools, but with variations that take into account the location, conditions and resources of each community. Communities should be empowered to build the facilities they need, with suitable adaptations to standard models, as long as these facilities meet the new minimum requirements.

Moreover, the GAEB must also lead and support communities to develop strong working relationships with the ministries in charge of water and sanitation, as well as with local municipalities. This can be very helpful in choosing the most adequate and affordable technology, possibly sharing costs, receiving professional technical advice during implementation, and training school staff and the community in proper maintenance (see Theunynck, 2009).

All the required elements of the school facilities should be included in one table. The typical costs of these individual elements should also be made available to the public to enable current costs to be compared to possible alternatives. For example, wire or wooden fences and lines of trees would similarly demarcate the area of the school and provide a safety measure, but would be less costly and more environmentally friendly and aesthetically appealing than expensive concrete walls. Earthquake risk is also grossly overemphasized and the related regulations and precautions the GAEB adopts, and their costs, should be made public. These standards should be revised in line with other countries that have similar earthquake risks.

The new minimum standards should be developed via a series of consultations with relevant stakeholders. Minimum requirements should be collectively agreed upon, and a range of adaptable options can then be considered based on international and local best practices. This means that adaptations from international experience, from Egyptian private schools, and from local community experience should be studied and collected before being discussed with stakeholders in different rounds of consultations. Such stakeholder consultations should allow for the creation of flexible guidelines that communities, schools, and educational districts can draw upon when considering different options for school construction and maintenance. Other questions might arise in such consultations and should be explored. Some of these options have been raised in discussions during the preparation of this report, but most require careful consideration and consultation with stakeholders. For example, it is possible to consider whether remedies such as a school bus if the school is far away, having taller buildings with elevators and regular maintenance in urban areas where land is scarce, or establishing a rooftop playground in areas of land scarcity would work for a given community and with its current budget.

4.4. Reform Financial Regulations and Spend More on Maintenance

Adopting a funding formula based on per student costs (a desirable reform of the current distribution of educational spending in Egypt) would create greater transparency around building schools. The costs of rural schools with low numbers of students could then be compared with the cost per student at larger urban schools. Moreover, the amount of funds allocated to school maintenance, the ease with which schools can use these funds, and the hiring of cleaning and maintenance staff are all areas that require urgent reform. In terms of maintenance, new construction should systematically include provisions for the financing of maintenance functions throughout the life of the school building (Theunynck, 2003). The estimated cost of infrastructure maintenance can be assumed at a rate of 2% annually of the initial investment and 5% for furniture (Theunynck, 2009). New regulations relating to the annual allowances for maintenance costs must therefore take into account these percentages.

Furthermore, given the current difficulties schools face to even access their very limited maintenance funds, a critical area of reform is to incentivize the staff responsible for disbursing maintenance funds so that they will advise, coach, and support schools in handling financial matters, not stifle their efforts.

The other clear area for reform is the hiring and training of maintenance and cleaning staff. Each school should be provided with the appropriate budget for hiring a sufficient number of caretakers and cleaners, who should be given the necessary resources and materials to perform their tasks. As a temporary solution, schools in very close proximity could perhaps share properly compensated cleaning staff or hire the services of municipal cleaning staff. Selected staff could also be trained and authorized to perform small routine maintenance tasks around the school. A workable solution could be to have maintenance teams based in the educational district and available to operate in local schools that request their services, but the education ministry's notoriously low allowances for transportation might make this solution unworkable in reality, unless the ministry reforms its system of transportation reimbursement. The additional funds needed to cover these essential costs would easily be made available through the savings from school construction costs, based on the recommendations below.

4.5. Build Larger Urban Schools and Smaller Rural Schools

As explained above, over 75% of students are in overcrowded classrooms, and the need for more classroom construction is well recognized by policy-makers. As the GAEB already has the capacity to build more classrooms, it is imperative to consider future population projections and plan educational infrastructure accordingly. In planning future schools in crowded urban areas, and with urbanization expected to continue growing, the best policy would be to build bigger urban schools. This means the GAEB would need to shift from building schools that end up being overcrowded to bigger ones that can accommodate a rapidly growing population. On the other hand, in villages with small populations and locations where populations are more dispersed, Egypt needs to catch up with the rest of the world in building smaller (possibly multi-grade) schools that are more accessible to children, without forcing them to walk long distances or on dangerous roads; that is, schools that are within 1 km of student homes. In this regard, the GAEB could build on its Access Model (*namouthaj al-itaha*), which was designed for small villages but not widely applied, after undertaking a full review of its use so far.

4.6. Organize and Support Land Acquisition and Re-Allocation

Dealing with the issue of land scarcity and allocation is unavoidable. The current practice of waiting until a donor provides a piece of land will necessarily lead to severe shortages and to many schools being built where land is available, not where the need is greatest. The restructuring of the GAEB should lead to a process whereby communities come together with municipalities and relevant bodies to decide on plots of land or existing buildings that are needed for schools, and to be familiarized with a variety of clear mechanisms to acquire land or seek its reallocation for public use. The costs need not be directly paid out of the education ministry's budget. Other official entities could contribute to or be responsible for compensating landowners whose land is designated for public use, as it compensates owners whose land is designated for building bridges or other important infrastructure. For example, a plot could be purchased by the municipality, which would then have the right to re-allocate it for another use in later decades (e.g. when birth rates decrease and less schools are needed or communities re-locate to other districts). There are many experiences, especially in densely populated Asian cities, that can provide ideas about different strategies and their advantages and disadvantages, but essentially in crowded areas where land is already expensive, waiting for a donation is not a workable solution. Directing more funds to land acquisition could also be done within a reasonable budget, especially once the GAEB makes large savings in its construction costs. It is critical in this regard that more data be made publicly available about school-related land issues. Lessons should also be drawn from the GAEB's previous large construction campaign after the 1992 earthquake.

5. Conclusion

A reform of school construction and maintenance regimes in Egypt is absolutely imperative. Comfortable and appropriate school facilities have been shown to increase student attendance and improve learning outcomes, while also saving money. Given the recently announced plans to build 250,000 new classrooms at a cost of EGP 130 billion, this seems to be the perfect moment to introduce necessary reforms that would lower the cost of school construction and better meet the growing and diverse needs of a new generation of students.

This paper has provided an analysis of the key issues relating to school construction in Egypt within a global perspective and has offered a set of concrete recommendations for the policy reforms that are required to deal with these issues. These investments in infrastructure are essential for the future of Egyptian education, although to reap the full benefits they must be paired with other vital educational reforms, particularly an overhaul of teacher quality; reforms to improve wages and the quality of teaching will help to remedy the critical problems of teacher absenteeism and poor quality instruction.

These essential reforms will lead to a better learning environment and a more dignified experience for the nation's children, to which they are all entitled, regardless of their social or economic background.

6. Appendices

Appendix (1): The General Authority for Educational Buildings (GAEB)

As per ministerial decree no. 1643 of 2015 and decree no. 338 of 1988, the General Authority for Educational Buildings (GAEB), affiliated with the Ministry of Education, has the responsibility for organizing the process of building and furnishing public schools. It is responsible for building, selling, and replacing buildings and land necessary for achieving those purposes. Its scope of work includes developing and acting upon a plan that should begin with a needs assessment study at the level of each administrative division to determine the needs of each governorate, as well as to highlight the necessary budget for implementation within a specific timeline. It is also expected to develop educational buildings' standards, specifications, and designs, taking into account the difference between urban and rural areas, new pedagogical strategies, and the needs of each educational stage. The GAEB acts as the technical authority responsible for the maintenance and renovation of existing school buildings in coordination with the decentralization units in the directorates of education.

A needs assessment to the targeted location and the surrounding areas takes place to determine the need for a new school. Based on this assessment, the GAEB is able to determine the purpose/need for establishing a new school. The need might stem from: reducing school shifts, decreasing class density, making schools available in deprived areas, renovating old schools, replacing rented buildings, increasing the number of kindergarten classes, and/or providing places for special needs education. The study is complemented by an educational review, in collaboration with the local educational directorate, to make sure that the location is well situated. The purpose of the review is to ensure the correct educational atmosphere around the schools, how quiet the area is, and how close educational and sports facilities are to the suggested place. For example, areas that are near open sewage, cemeteries, or public garbage dumps should not be an option when considering a location for a school. Moreover, in determining the location, the walking distances and the service areas should be respected.

Appendix (2): Typical Model Requirements

Element	Basic Education Requirements				
	11-Class Schools	22-Class Schools	33-Class Schools	44-Class Schools	55-Class Schools
Number of Classes					
Kindergarten Classes	2	4	6	8	10
Primary Education Classes	6	12	18	24	30
Preparatory Education Classes	3	6	9	12	15
Kindergarten Criteria					
Activity Room	1	1	1	2	2
Computer and Multimedia Room	1	1	1	2	2
Principal's Room	1	1	1	1	1
Teachers' Room	1	1	1	2	2
Laboratories					
Science Lab and Preparation Room	1	1	1	2	2
Computer Lab	1	1	1	1	1
Technology Development	1	1	1	1	1
Activity Rooms					
Technical/Agriculture	1	1	1	1	2
Arts	1	1	1	1	1
Music	1	1	1	1	1
Library	1	1	1	1	1
Administration Rooms					
Principal	1	1	1	1	1
Vice Principal + Deputy		1	1	1	1
Secretarial + Finance	1	1	1	1	1
Secretary of Inventory		1	1	1	1
Teachers	2	2	3	4	4
Social Worker	1	1	1	1	1
Multipurpose Room	1	1	1	1	1
Clinic	1	1	1	1	1
Prayer Room	1	1	1	1	1

Source: General Authority for Educational Buildings, 2011.

Appendix (3): Different Criteria for a Basic Education School in New Urban Communities vs. Established Cities and Villages

Criteria	New Urban Communities	Cities and Villages
Minimum school area for basic education school	2,500 m^2	1,200 m^2
Minimum school area for mixed school (basic education + secondary education)	2,500 m^2	2,500 m^2
Student's share of the total area in basic education school	8 m^2	4 m^2
Student's share of the total area in mixed school (basic education + secondary education)	10 m^2	5 m^2
Student share in playgrounds and open areas in basic education school	5 m^2	2.5 m^2
Student share in playgrounds and open areas in mixed school	7 m^2	2.75 m^2
Maximum number of students/class in Arabic basic education school	40 students/class	40 students/class
Maximum number of students/ class in Arabic kindergarten	36 students/class	36 students/class
Minimum number of students/class in Arabic basic education school	25 students/class	25 students/class
Minimum school size	One grade that is expected to continue progressing into the next grades	One grade that is expected to continue progressing into the next grades
Maximum number of classes in basic education school	55 classes	55 classes Class size might increase by 20% in overcrowded cities and other areas. However, a student's share in the playground should not be less than 2 m^2 in basic education schools.
Number of entrances	Minimum 2 entrance gates	
Dimensions of the school building	At least one of the sides of the school should be on the main road, with a two-way street. The width of the site should not be less than the minimum allowed and should be connected to the network of surrounding streets, not less than 10 meters. This takes into consideration the square shape of the site; and in the rectangular sites, the width to length ratio shall not exceed 1:3 and the length of any side shall not be less than 40 m.	At least one of the sides of the school should be on the main road, with a two-way street. The width of the site should not be less than the minimum allowed and should be connected to the network of surrounding streets, not less than 6 meters. This takes into consideration the square shape of the site; and in the rectangular sites, the width to length ratio shall not exceed 1:3 and the length of any side shall not be less than 40 m.

Criteria	New Urban Communities	Cities and Villages
Duel stadium	Present	Present
An inner courtyard	Minimum 400 m^2	Minimum 200 m^2
Maximum height of the school buildings	Plaza + 4 levels for an Arabic school	Plaza+ 4 levels for an Arabic school
Essential administrative elements	Principal's room, vice Principal's room, secretary, finance office, treasurer, social worker, two-room clinic. The room should not be less than 12 m^2	Principal's room, vice Principal's room, secretary, finance office, treasurer, social worker, two-room clinic. The room should not be less than 10 m^2
Essential service elements	Multipurpose room (not be less than 12 m^2), prayer area with ablution area, canteen, storage area, toilets for students, toilets for staff.	Multipurpose room (not be less than 10 m^2), prayer area with ablution area, canteen, storage area, toilets for students, toilets for staff.
Toilets	1 toilet/30 students	1 toilet/30 students
Class area	No less than 42 m^2, with a length of no more than 9 m^2 (measured by the distance between the first and the last student in a queue)	No less than 38 m^2, with a length of no more than 8.5 m^2 (measured by the distance between the first and the last student in a queue)
Student share/class	2 m^2	1 m^2
Laboratory	No less than 42 m^2, with 2 exits	No less than 38 m^2, with 2 exits

Source: General Authority for Educational Buildings, 2011.

Appendix (4): Number of Projects Launched in Each Governorate 2014-2018

Governorate	Projects	Classrooms	Class Density in 2018
Suez	14	188	39
Matrouh	24	244	37
New Valley	24	269	27
Port Said	20	310	37
North Sinai	45	415	30
Red Sea	38	429	35
South Sinai	50	450	23
Ismailia	36	467	39
Luxor	50	658	40
Aswan	75	1,009	35
Damietta	80	1,149	42
Alexandria	70	1,200	46
Cairo	75	1,485	40

Governorate	Projects	Classrooms	Class Density in 2018
Kafr El Sheikh	142	1,788	43
Beni Souif	126	1,855	44
Qena	163	1,867	42
Fayoum	157	1,995	45
Qaliyoubia	124	2,220	47
Souhag	200	2,543	44
Daqahlia	182	2,761	44
Giza	138	2,805	49
Menoufia	184	2,837	44
Gharbia	195	2,961	47
Assiut	223	3,391	46
Beheira	237	3,589	45
Minya	254	3,730	45
Sharqiya	282	3,821	44
Total	3,208	46,436	

Source: General Authority for Educational Buildings, 2018.

Bibliography

AbdelBaset, L. (2018, October 8). Tariq Shawqi: Nahtaj 130 milyar lihalaa azmat altaelim [Tarek Shawki: We need 130 billion to solve the education crisis]. *Al-Shorouq*. Retrieved from https://www3.shorouknews.com/news/view.aspx?cdate=08102018&id=0d3266c4-c7cd-4956-8a3c-d6748c03efd5

Alyahri, A., & Goodman, R. (2008). Harsh corporal punishment of Yemeni children: occurrence, type and associations. *Child Abuse & Neglect*, *32*(8), 766-773.

Bakry, W., & Al-Qadi, Y. (2010, June 21). Muzawfu <<alabniat altaelimia>> yarbitun iinha ietisamahum biaetithar rasmii min <<Bdr>> wasarf almukafaat [Employees of "educational buildings" tie the end of their sit-in to an official apology from Badr and the payment of bonuses]. *Al-Masry Al-Youm.* Retrieved from https://www.almasryalyoum.com/news/details/459

Barrera-Osorio, F., Bertrand, M., Linden, L. L., & Perez-Calle, F. (2011). Improving the design of conditional transfer programs: Evidence from a randomized education experiment in Colombia. *American Economic Journal: Applied Economics 3(2),* 167–95.

Bonner, R., Das, P. K., Kalra, R., Leathes, B., & Wakeha, N. (n.d.). *Delivering Cost Effective and Sustainable School Infrastructure.* The TI-UP Resource Centre. Retrieved from the Department for International Development website: https://www.gov.uk/government/publications/delivering-cost-effective-and-sustainable-school-infrastructure-guidance-not e

Bray, M. (1989). *Multiple-Shift schooling: Design and operation for cost-effectiveness.* Paris: The Commonwealth Secretariat Commonwealth Secretariat.

Chingos, M. M. (2011). T*he false promise of class-size reduction*. Retrieved from Center for American Progress website: https://cdn.americanprogress.org/wp-content/uploads/issues/2011/04/pdf/class_size.pdf

Crampton, F. E. (2009). Spending on school infrastructure: does money matter? *Journal of Educational Administration 47*(3), pp.305-322, https://doi.org/10.1108/09578230910955755

Caldwell, B.J. (2009) Centralisation and decentralisation in education: A new dimension to policy. In J. Zajda, & D. Gamage (Eds.), *Decentralisation, School-Based Management, and Quality*. (pp. 53-66). Springer Netherlands.

Elbadawy, A. (2014). *Education in Egypt: Improvements in attainment, problems with quality and inequality* (Working paper No. 854). Retrieved from Economic Research Forum website: https://erf.org.eg/wp-content/uploads/2015/12/854.pdf.

Fawaz, Y. (2017, May 30). Barlmani: Fasad alabnia altaelimia adaet alaf alafdina min aradi aldawla [MP: The corruption of the educational buildings authority has led to the loss of thousands of acres of state land]. *Al-Mal.* Retrieved from https://www.almalnews.com/Story/335729/19/%D8%A8%D8%B1%D9%84%D9%85%D8%A7%D9%86%D9%8A--%D9%81%D8%B3%D8%A7%D8%AF-%D8%A7%D9%84%D8%A3%D8%A8%D9%86%D9%8A%D8%A9-%D8%A7%D9%84%D8%AA%D8%B9%D9%84%D9%8A%D9%85%D9%8A%D8%A9-%D8%A3%D8%B6%D8%A7%D8%B9-%D8%A2%D9%84%D8%A7%D9

Gauri, V., & Vawda, A. (2004). Vouchers for basic education in developing economies: An accountability perspective. *The World Bank Research Observer 19*(2), pp. 259-280.

Gee, K. A. (2015). Achieving gender equality in learning outcomes: Evidence from a non- formal education program in Bangladesh. *International Journal of Educational Development 40,* pp.207-216.

General Authority for Educational Buildings. (n.d.). Retrieved from http://gaeb.gov.eg/GAEBPortal/home/home.jsp

General Authority for Educational Buildings. (2011). Maaier w ishtratat salahiet el mawaqea w almabani al-madrasia, madares al-taliem al assasi w althanawi (belmodon w alqora alqa'ema)[*The criteria and conditions for the suitability of location and school buildings basic education schools and secondary education for established cities and villages]* .

General Authority for Educational Buildings. (2011). Maaier w ishtratat salahiet el mawaqea w almabani al-madrasia, madares al-taliem al assasi w althanawi (belmodon alomrania algadeda)[*The criteria and conditions for the suitability of location and school buildings basic education schools and secondary education for new urban communities]* .

General Authority for Educational Buildings. (2018). Alinjazat khelal al fatra mn youlo 2014 hata aghostos 2018 [*Achievements from July 2014 to August 2018]*. Retrieved from General Authority for Educational Buildings.

Gershberg, A. I. (2014). *Educational infrastructure, school construction, & decentralization in developing countries: Key issues for an understudied area* (Working paper No. 14-12). Atlanta, Georgia: International Center for Public Policy. Retrieved from https://scholarworks.gsu.edu/cgi/viewcontent.cgi?article=1020&context=icepp

Hassan, I. (2016). Ra'ees hai'et al-abneia al-talemia le Khaled Salah: 13,000 madarsa tahtag le siana kamela [Head of Educational Buildings Authority to Khalid Salah: 13,000 schools need comprehensive maintenance]. *Al Youm El Sabea*. 06 September 2016. https://www.youm7.com/story/2016/9/6/رئيس-هيئة-الأبنية-التعليمية-لـ-خالد-صلاح-13-ألف-مدرسة/2873124.

Hegazy, S. M. 2012. Unconventional approach to re-qualify existing public basic schools in developing countries - Egypt: A case. *International Journal of Arts and Sciences*, 225–238.

Ibrahim, N. (2017). *Efforts for Improving Building Conditions in Public Schools in Egypt: SWOT Analysis of Two Governmental Renovation Programs* (Master's thesis, The American University in Cairo, 2017) (pp. 1-106). Cairo: The American University in Cairo.

International Institute for Educational Planning. (2004, October-December). Decentralization – can it improve schools? *International Institute for Educational Planning Newsletter 22*(4).

Jepsen, C. (2015). Class size: does it matter for student achievement? *IZA World of Labor*.

DeStefano, J. & Moore, A.-m S. (2007). Reaching the Underserved: Complementary Models of Effective Schooling. Retrieved from https://files.eric.ed.gov/fulltext/ED505689.pdf

Kane, E. (2004). *Girls' education in Africa: What do we know about strategies that work?* (Africa Region Human Development Working Paper No. 73) Washington, DC: World Bank.

Kholif, W. A. (2015). Analysis of Time and Cost Overrun in Educational Building Projects in Egypt (Master's thesis, Arab Academy for Science and Technology and Maritime Transport, 2015) (pp. 1-148). Cairo: Arab Academy for Science and Technology and Maritime Transport.

Klitgaard, R. E., Abaroa, R. M., & Parris, H. L. (2000). *Corrupt cities: a practical guide to cure and prevention*. World Bank Publications.

Langsten, R. (2016). Community-based education in Egypt: is it achieving its stated goals? *Compare: A Journal of Comparative and International Education*, 457-478.

Langsten, R., & Hassan, T. (2018). Primary education completion in Egypt: Trends and determinants. *International Journal of Educational Development*, 136–145.

Leuven, E., & Oosterbeek, H. (2018). *Class size and student outcomes in Europe.*

Lockheed, M. E., & Verspoor, A. M. (1991). *Improving primary education in developing countries.* New York, NY: Oxford University Press.

Michaelowa, K., & Wechtler, A. (2006). *The cost-effectiveness of inputs in primary education: Insights from the literature and recent student surveys for sub-Saharan Africa* (Study). Paris: Association for the Development of Education in Africa

Mingat, A., Rakotomalala, R., & Tan, J. P. (2002). *Financing education for all by 2015: simulations for 33 African countries*. African Region, World Bank.

Ministry of Education. (n.d.). *Talameez- Hekomy, Khas, Hadar, Reef [Students, Public-Private, Urban, Rural]*. Retrieved from Al Bab Al Thany: Madares, Fesol, Talameez [Second Chapter: Schools, Classes, Students]: http://emis.gov.eg/Site%20Content/book/017018/sch_clas_stud/stud/3.pdf

Ministry of Education. (2014). Alkitab alihsaa alsanawi [*Annual Statistics Book]*. Ministry of Education. Retrieved from http://emis.gov.eg/annual_book.aspx?id=400

Ministry of Education. (2015). Alkitab alihsaa alsanawi [*Annual Statistics Book]*. Ministry of Education. Retrieved from http://emis.gov.eg/annual_book.aspx?id=400

Ministry of Education. (2018). Alkitab alihsaa alsanawi [*Annual Statistics Book]*. Ministry of Education. Retrieved from http://emis.gov.eg/annual_book.aspx?id=400

Ministry of Finance. (2018). Almowazana al'ama 2018/2019 (*The State Budget 2018/2019)*. Cairo: Ministry of Finance. Retrieved from Ministry of Finance website http://www.mof.gov.eg/MOFGallerySource/Arabic/budget2018-2019/part1/M-P1-14.pdf

National Research Council. (2007). *Green schools: Attributes for health and learning*. Washington, DC: The National Academies Press. https://doi.org/10.17226/11756.

National Center for Educational Research and Development. (2014). *Education for all in Egypt 2000-2015: A national assessment.* Cairo: UNESDOC.

OECD. (2012). *Education at a glance in 2012: Highlights*. Paris: OECD. Retrieved from OECD website https://www.oecd-ilibrary.org/education/education-at-a-glance-2012_eag_highlights-2012-en

OECD. (2015). *Schools for skills – a new learning agenda for Egypt*. Paris: OECD. Retrieved from OECD website https://www.oecd.org/education/school/Schools-for-skills-a-new-learning-agenda-for-Egypt.pdf

Rady, A. (2018, May 14). Ihalat qadiat alfasad almalii waliidarii b<<alabniat altaelimia>> litadibiat alismaelia [Sending the case of the financial and administrative corruption in "the educational buildings" to Ismailia court]. *Al-Wafd News*. Retrieved from https://alwafd.news/%D8%AD%D9%88%D8%A7%D8%AF%D8%AB-%D9%88%D9%82%D8%B6%D8%A7%D9%8A%D8%A7/1879380-%D8%A5%D8%AD%D8%A7%D9%84%D8%A9-%D9%82%D8%B6%D9%8A%D8%A9-%D8%A7%D9%84%D9%81%D8%B3%D8%A7%D8%AF-%D8%A7%D9%84%D9%85%D8%A7%D9%84%D9%8A-%D9%88%D8%A7%D9%84%D8%A5%D8%A

Rakotomalala, R., Majgaard, K., Becerra, M., Duret, E., Amelewonou, K., & Cuenin, S. (2007). *Le systeme educatif Burundais: Diagnostic et perspectives pour une nouvelle politique educative dans le context de l'education primaire gratuite pour tous* [The Burundian educational system: Diagnosis and prospects for a new educational policy in the context of free primary education for all]. (World Bank Working Paper No. 109). Washington, DC: World Bank.

Ramli, N. H., Ahmad, S., Mohd Taib, M., & Masri, M. (2014). Principals' perception on classroom physical environment. *Procedia - Social and Behavioral Sciences 153,* 266-273.

Robinson, G. E. (1990). Synthesis of research on the effects of class size. *Educational Leadership*, *47*(7), 80-90.

Ruffino, D. (Ed.). (2005). Education in Ethiopia: Strengthening the foundation for sustainable progress. Washington, DC: World Bank.

Schanzenbach, D. W. (2014). *Does class size matter?* Boulder, Colorado: National Education Policy Center. Retrieved from National Education Policy Center website: http://nepc.colorado.edu/publication/does-class-size-matter.

Shafiq, M. N. (2010). Designing targeted educational voucher schemes for the poor in developing countries. *International Review of Education, 56*(1), 33-50.

Shanker, A., Marian, D., & Swimmer, C. (2015). *Effective interventions aimed at reaching out-of-school children*. Kathmandu, Nepal: UNICEF Regional Office for South Asia.

Sharma, U., & Ng, O. (2014). What has worked for bringing out-of-school children with disabilities into regular schools? A literature review. *Disability, CBR & Inclusive Development*, *25*(2), 54-75.

Sobhi, A. (2013, April 2). Alabniat altaelimia

<<alsunduq alasud>> lidawlat aslfsad: Asrar almunaqasat raqm [Educational buildings: the "black box" of the state of corruption: Secrets of tender number five]. *Al-Ahram El-Araby*. Retrieved from http://arabi.ahram.org.eg/News/25089.aspx

Sobhy, H. (2012). The de-facto privatization of secondary education in Egypt. *Compare: A Journal of Comparative and International Education, 42*(1), 47-67.

Tawfik, G. (2018). Almadares w altafawet al-tabaqiman yonfiq 'ala altaleem fe masr [*Schools and the Class Gap: Who Spends on Education in Egypt?]* .Retirived from https://sjplatform.org/%D8%A7%D9%84%D9%85%D8%AF%D8%A7%D8%B1%D8%B3-%D9%88%D8%A7%D9%84%D8%AA%D9%81%D8%A7%D9%88%D8%AA-%D8%A7%D9%84%D8%B7%D8%A8%D9%82%D9%8A-%D9%85%D9%86-%D9%8A%D9%86%D9%81%D9%82-%D8%B9%D9%84%D9%89-%D8%A7%D9%84/

Theunynck, S. (2003). *Education for all: Building the schools.* (Education Notes series). Washington, DC: World Bank.

Theunynck, S. (2009). *School construction strategies for universal primary education in Africa: Should communities be empowered to build their schools?* (African Human Development series). Washington, DC: The World Bank. Retrieved the World Bank website: https://openknowledge.worldbank.org/handle/10986/2637

Thompson, E. J. (2001). *Non-formal education in urban Kenya: Findings of a study in Kisumu, Mombasa and Nairobi* (Research Report No. 143). Retrieved from the Education Resources Information Center website: https://files.eric.ed.gov/fulltext/ED455363.pdf

Transparency International. (2002). *Corruption Fighters' Tool Kit: Civil Society Experiences and Emerging Strategies.* Retrieved from Transparency International website: https://www.transparency.org/whatwedo/publication/corruption_fighters_toolkit_civil_society_experiences_and_emerging_strategi

UNESCO. (n.d.) Data for the sustainable development goals. Retrieved from http://uis.unesco.org/.

World Bank, Social and Economic Development Group, Middle East and North Africa Region. (2005). *Capital investment in the education sector: Egypt public expenditure review.* Washington, DC: World Bank.

Whitehurst, G. J., & Chingos, M. M. (2011*). Class size: What research says and what it means for state policy*. Retrieved from Brookings Institution website: https://www.brookings.edu/research/class-size-what-research-says-and-what-it-means-for-state-policy/

Yehia, W. (2018, September 29). Shawqy: Nahtaj 100 miliar jineh libanaa alf fasl lilqadaa ala kathafaat alfasool [Shawky: We need 100 billion pounds to build 200,000 classrooms to eliminate class densities]. *Al-Masry Al-Youm*. Retrieved from https://www.almasryalyoum.com/news/details/1327778

Youssef, M.A., Mohammed, I. A., Ibraheem, A. N., & Hussein, I. M. (2012). Value engineering analysis for the educational buildings in Egypt. *International Journal of Optimization in Civil Engineering, 2*(1), 103-113.

Zaalouk, M. (2004). *The pedagogy of empowerment: Community schools as a social movement in Egypt*. Cairo: American University in Cairo Press.

Zaalouk, M. (2005). Innovation and mediation: The case of Egypt. In N. Rao & I. Smyth (Eds.), *Partnerships for Girls' Education* (pp. 115-131). Oxford: Oxfam GB.

Zayed, N. (2016). The Pros and Cons of Teaching a Small-Sized Class. *International Journal of Education and Research, 4*(11), 271-276. Retrieved from https://www.ijern.com/journal/2016/November-2016/23.pdf.