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***Large Class Sizes in the Developing World:
What Do We Know and What Can We Do?***



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ABSTRACT

The purpose of this paper is to lay out a learning agenda for USAID and other donors on how to approach the problem of large class sizes in developing countries. In order to do so, the desk study reviews the literature on large classrooms and learning outcomes, as well as a number of other aspects of educational quality that large classrooms impacted. The study provides examples of efforts that have been made through teacher training efforts to address the issue of large classrooms and uses current research to suggest an agenda for developing cost effective and sustainable methods of addressing large classroom instruction.

INTRODUCTION

Teachers around the world face many obstacles when attempting to teach in overcrowded classes. Used interchangeably, *overcrowded or large classrooms* are those where the pupil-teacher ratios (PTR) exceed 40:1. Such classroom conditions are particularly acute in the developing world where class sizes often swell up and beyond 100 students. There are differing opinions about the causes of overcrowded classes in the developing world: reduction/elimination of school fees and/or rapid population growth. The reality, however, is that each of these factors have worked to increase class size, and thus affect the quality of education delivered in resource-poor schools.

This paper will detail the factors that contribute to overcrowded classrooms in the developing world, document how these affect teaching and learning and suggest methods to cope with overcrowding. We do so in three steps: 1) by placing the large classroom in context, looking at the reasons for growing enrollments in the developing world; 2) discussing the research on large classrooms, specifically examining its impact on learning outcomes; and 3) suggesting methods that can be used to teach in large classrooms, and propose areas for future investigation around these methods.

POPULATION GROWTH, EFA AND LARGE CLASSROOMS IN DEVELOPING COUNTRIES

The growth of large classrooms in the developing world is tied to two interrelated trends: global initiatives for universal education and rapid population growth. These are a result of a web of factors that make large classrooms an enduring feature of the developing world.

Rapid population growth is the foundation upon which discussions of school overcrowding rest. In the four decades between 1959 and 1999 the world's population doubled, with countries in sub-Saharan Africa and South Asia witnessing the highest growth rates. Of the countries with the 10 fastest growing populations, six are located in sub-Saharan Africa. As depicted in Figures 1 and 2, rapid population growth corresponds to a reordering of a country's demographic profile, visible in the large percentages of young persons (under 15 years of age). Figure 1 depicts what demographers have coined as a *youth bulge*. Angola is typical of most developing countries, where the majority of the population is school age children. Figure 2, which depicts Germany's demographic profile, is representative of developed countries that have an ageing population with little, if not negative, population growth.

There have been widely publicized calls for improving education access for all the world's children. Since the 1990 World Conference on Education for All (EFA) in Jomtien, there has been a five to seven percent increase in student enrolments in primary education. Ten years later, the 2000 Dakar World Conference convened to assess the progress made towards EFA and set interim goals. These "Dakar Goals" include: expanded access for early childhood education; free and compulsory education; increased use of life-skills education; increased adult literacy; reduced gender disparities; and overall enhanced educational quality. Of these six goals, many governments have made educational access central to their national development strategy. This has been addressed largely through the elimination of school fees, or the significant reduction in the costs of schooling.

Costs reductions, while well intended, are not without potentially negative side effects. With the public sector no longer collecting tuitions, the amount available to fund for public education is significantly reduced. With reduced funds available for education, common rural-urban divides can be made more pronounced. As there is now less money to go around, education in urban areas tends to receive greater attention. While more teachers are recruited and schools are constructed in the cities, rural villages are often ignored, leaving larger classrooms with less experienced teachers an enduring reality (UNESCO, 2004).

Cost reductions and the soaring enrollments that result cause further complications. As the public sector now has less to spend on education, the costs to support schools often trickle down to parents. A report from the UK Department for International Development (Boyle et al, 2002) cites myriad examples of parents being asked to cover new costs, ranging from ‘school development fees’ to teacher funerals. Furthermore, the opportunity costs of sending children to school affects the poorest who may rely on their children to support food production and/or care for other family members. In most cases, it is the girl student who suffers most from these new opportunity costs, in that they are often responsible for such household tasks.

While the 2000 goal of basic education for all children was not met, there has been significant movement in that direction. In developing countries, the average net enrollment for primary education increased from 78% in 1990 to 83% in 2000 (Vandemoortele, 2003).

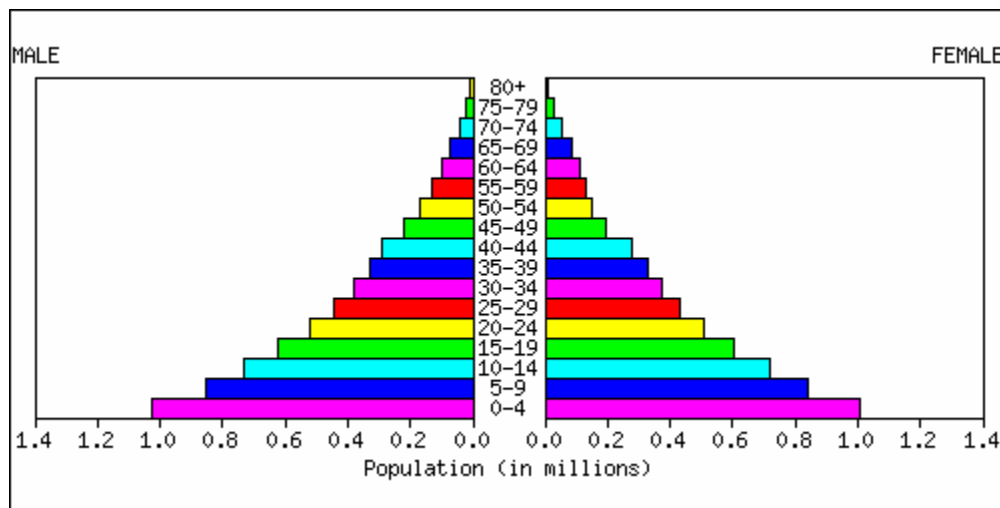


Figure 1. Angola: 2005 (Source: U.S. Census Bureau, International Data Base)

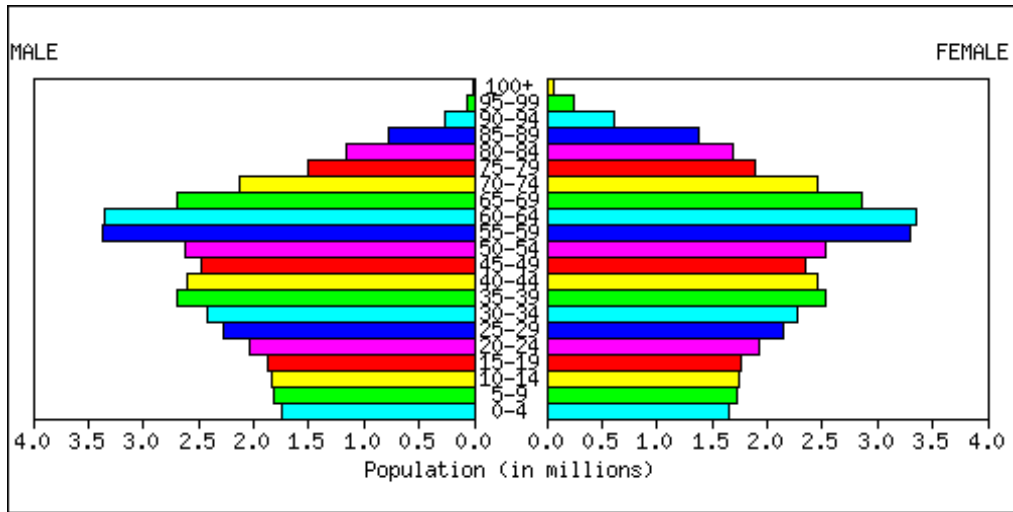


Figure 2. Germany : 2005 (Source: U.S. Census Bureau, International Data Base)

Between 1990 and 2000, the world’s primary school-age population grew from 600 million to 648 million. Demographers argue that by 2015 that number could exceed 700 million (World Education Forum, 2000). These figures express the scale needed to meet the demand for education and to ensure that all school-age children are enrolled by 2015, as stipulated in Education For All (EFA) and Millennium Development Goals (MDGs). As detailed in Figure 3, Sub-Saharan Africa has recorded the largest increases in the primary school age group: up from 84 million in 1990 to 106 million in 2000, an average growth of 2.6 per cent per year. Despite a recent slow down in the pace of this growth, the school-age population in sub-Saharan Africa is set to reach an estimated 140 million by 2015 (UN, 2003).

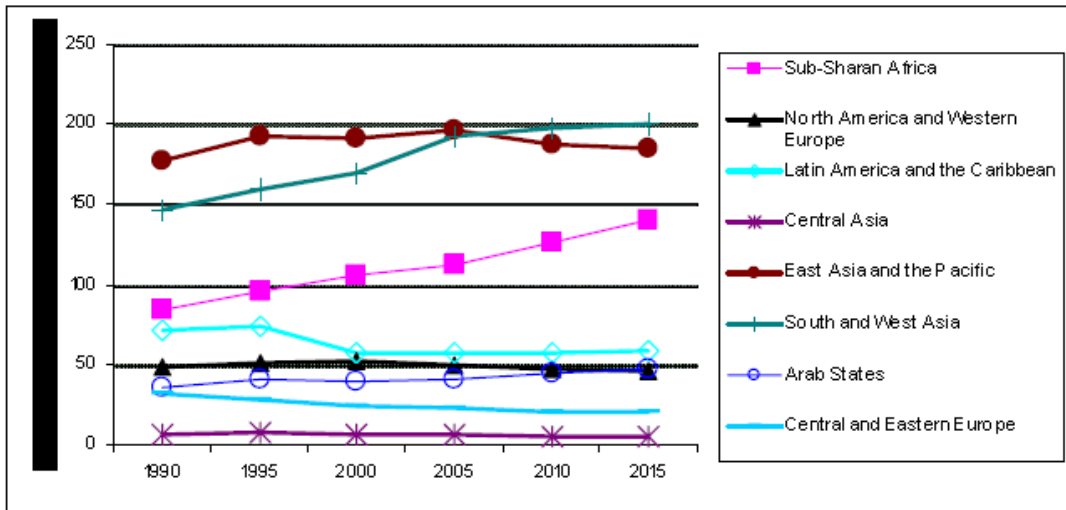


Figure 3. Trends in the primary school-age population by region, 1990-2015 (Source: UNESCO Institute for Statistics)

The impact of such growth on educational systems is profound, resulting in the five to seven percent increase in primary student enrollments throughout the developing world (UNESCO,

2006). Between 1999 and 2004 this amounted to an increase of over 37 million children enrolling in primary education. While increased enrollments may suggest school systems have increased their capacity to accommodate more children, this does not necessarily translate into improved educational quality. Reduced quality can be captured through pupil-teacher ratios. Generally, when ratios rise above 40 for every teacher, the quality of teaching and learning, in most contexts, begins to suffer. UNESCO (2006) estimates that 84% of classrooms have less than 40 students to every teacher. Of those countries that exceed 40:1, most are in sub-Saharan Africa and Asia. Sub-Saharan Africa has the highest median PTR, with the Congo, Ethiopia and Malawi hovering around 70:1. South and East Asia also have high PTRs, with Afghanistan and Cambodia exceeding 55:1 (UNESCO 2006).

WHAT THE RESEARCH SAYS ABOUT LARGE CLASSROOMS

Within the literature on large classrooms in North American and Western Europe there is equivocation about the point at which classes become too large and negatively impact education quality. In Western countries, class sizes of 30 are considered large and in need of reduction. To complicate the issue further, there are examples of very large classrooms with excellent student learning outcomes. South Korea, who placed second on the 1996 TIMSS, has an average of 56.9 students per class in mathematics and 48.8 in science. Similar conditions have been observed in both Japan and Singapore, where students are also excelling in larger classes.

Numerous analyses of classroom data, many of which are documented below have been unsuccessful in making definitive statements about the affect of large classrooms on learning outcomes. Some have argued that, intuitively, smaller classes have a positive impact on student achievement, where others conclude that there is no significant impact. There are points of agreement, however. In European and North American contexts there is agreement that small classes benefit young children and those from disadvantaged or minority backgrounds. These benefits occur due to a number of factors, including: increased teacher contact, differentiated instruction, improved classroom management, and improved teacher morale (Gates Foundation, n.d.; Vander Ark, 2002). Researchers have also noted that the academic gains seen in young children from smaller classes tend to persist into higher grades.

The STAR project, conducted in Tennessee between 1985-1989, provides the most convincing case for class size reduction. The project was implemented in 79 schools for 7,000 K-3 students. Children and teachers were randomly assigned to one of three types of classrooms: small (13-17 students), regular (22-25 students with one teacher), and regular with teaching aide (22-25 students with one teacher and one teaching aide). In evaluating the impact of these three scenarios, it was concluded that small classes (i.e., 13-17 students with one teacher) produced better student achievement in both reading and mathematics, with disadvantaged/minority children benefiting more than majority children (17% increase for minority students, as opposed to 7% for majority students). Bain et al (1989) analyzed 50 of the most successful teachers (i.e., those whose students showed the greatest academic improvement) involved in the STAR study and revealed a core of common features of these classrooms. These include: teachers holding students to high expectations; clear and focused instruction; use of differentiated instruction to accommodate various learning styles; use of incentives and rewards to promote learning; highly routinized classroom procedures; high standards for classroom behavior; and maintaining excellent personal interactions with students. Perhaps the more revealing feature, however, was

that of the 50 successful teachers exhibiting these qualities, all had either small classes (i.e., not greater than 20 pupils) or a teacher's aide (Bain et al, 1989).

While the STAR project is often cited as the best evidence to reduce class sizes, there is equal evidence to the contrary. Ehrenberg et al. (2001) conducted a meta-analysis of class size studies, examining its impact on student achievement. In contrast to the STAR evaluation, Ehrenberg concluded that there was no significant evidence that variations in class size explain improvements in student achievement. Even if some correlation did exist, Ehrenberg suggests the benefits are too modest to warrant the high costs of class size reduction implementation.

Where research on large classrooms in developing countries does exist, it is just as inconclusive. Hanushek (1995) reviewed 96 studies that attempted to link various educational inputs to student performance in developing countries. Nearly a third of the reviewed studies (n=31) specifically investigated the effect of pupil-teacher ratio. Of these, only eight found reductions in class size to significantly explain improved academic achievement. Furthermore, the size of classes in the studies was extremely varied, ranging from 30 to more than 100. This variation makes it difficult to make valid conclusions as to whether class size impacts student achievement.

Michaelowa (2001) examined 37 variables hypothesized to impact basic learning competencies in five francophone sub-Saharan African countries (Cameroon, Cote d'Ivoire, Burkina Faso, Madagascar, and Senegal). The variables were analyzed hierarchically at three levels: student, school/class, and country level. From her analysis she concluded there was an inverse relationship between class size and learning outcomes. That is, as class sizes increased, student learning decreased. Furthermore she concluded that 62 students per teacher was a threshold number. Once classes surpass 62, she argues, learning effectively stops, or is so compromised as to not make a meaningful impact upon students. Yet despite this equivocation in the literature, there is a body of research that indicates large classrooms do impact intermediate variables that in turn can negatively affect teaching and learning. We explore these issues next and then look at the ways these variables could be mitigated.

The Impact of Large Classrooms on Teachers' Practice

Large classrooms can negatively affect two significant and interrelated aspects of teacher practice – instructional time and classroom management. Regarding the former, there is research to suggest that teachers in larger classrooms devote less time to math instruction and integrated reading and writing tasks (Wilson, 2006). Other research indicates teachers in smaller classes are more likely cover a range of subjects, such as current affairs, history, geography, and social studies (Holloway, 2002). Large classes take a toll on the teacher's ability to manage time, requiring more time to be devoted to instructions (i.e., how to complete an exercise rather than substantive instruction), task management and behavioral management, thus leaving less time for actual instruction (Wilson 2006; Holloway, 2002; Ehrenberg, et al., 2001). Wilson (2006) reports that larger classes are noisier and that pushing, crowding, and hitting occur more often in larger classes than smaller. A review of the suspension records from Grade 10 for students who participated in the STAR project in Tennessee in grades K-3 found that the mean number of days of suspension were lowest (.32 days) for those students who were placed in small classes, followed by those placed in regular classes without an aide (.62 days) and regular classes with an aide (.77 days) (Wilson, 2006).

Class size may also impact teacher motivation and job satisfaction. Finn et al (2003) constructed a conceptual model that considers the impact of class size on teachers' morale and enjoyment of their profession, which in turn impacts students' engagement. He refers to a "sense of community" that can exist within a classroom and suggests that smaller classes positively impact teacher and student motivation. Teacher motivation is further complicated in many resource-poor countries. In Zambia, for example, teacher attrition is increasingly becoming a problem as salaries, work conditions, professional development opportunities, and support grow inadequate (Nilsson, 2003). This combination of factors creates a scenario in which teachers face enormous challenges in producing productive learning environments.

Impact of Large Classrooms on Students

Class size has many effects on students' engagement, behavior, and student retention. Finn (2003) reviewed studies that examined the link between student engagement and class size. He conceptualizes student engagement in two forms: social engagement and academic engagement. Social engagement refers to how a student interacts socially with other students and teachers in either pro- or anti-social ways. Academic engagement refers to a student's attitude towards schooling and the learning process. Finn (2003) concludes that when students are placed in smaller classes they become more engaged, both academically and socially. With strong social and academic engagement, he argues, academic achievement increases.

Pupil attention is an area of particular concern in that it can affect academic engagement. Also known as time-on-task, researchers have shown that students tend to spend less time on class assignments when in large classes (Blatchford and Mortimore, 1994; Cahen in Cooper, 1989; Carter in Cooper, 1989; Klein, 1985). Furthermore, it has been shown that in addition to spending more time on school work, students in smaller classes tend to participate more (Cahen in Cooper, 1989). While there have been few systematic observations of this interaction, some have argued that: 1) smaller classes allow teachers to engage their students in a differentiated fashion, that is, teachers can cater their instruction in ways that engage individual students; 2) with smaller numbers of students, teachers are able to pay closer attention to all students, thereby holding them accountable for participation, rather than ignoring those that are passive (Blatchford and Mortimore, 1994; Harder, 1990; Pate-Bain et al, 1992).

Large Classrooms and Learning Resources

While there is disagreement around the relationship between pupil-teacher ratios and learning, there is conclusive evidence that having an appropriate level of basic school resources can greatly improve student achievement (Hanushek, 1995). Michaelowa (2001) found that "the availability of books appears to be the most important factor [in high-achieving, student learning]." Additionally, she found that having books available in students' homes can improve achievement scores by 2-3% and that having appropriate classroom equipment such as benches, blackboard, chalk, and a teacher desk and chair can improve scores by two percent. One of the biggest problems faced by large classrooms, in developing countries is the quality and quantity of learning resources available to each student, such as desks, textbooks, and other teaching and learning supplies (Hanushek, 1995).

IMPROVING EDUCATIONAL QUALITY IN THE FACE OF LARGE CLASSROOMS

The repertoire of effective teaching practices for overcrowded classes is often described as limited. That is, the methods that teachers can use in a large classroom are not as plentiful as

those available to teachers in small classes. There is some truth in this statement. In small classes, teachers are able to practice a variety of methods, such as learning centers, higher order questioning, and other active-learning approaches. Furthermore, teachers are more likely to provide individualized attention in small classes (Wilson, 2006). Teaching in large classes, however, tends not to be a topic covered in most teacher education coursework. The result is that teachers are left unprepared for the unique challenges faced in the large classroom. However, as detailed later in this report, there are a host of methods that teachers can make use of when teaching in large classes. Among these are small group discussions, peer tutoring, and shift teaching. Even whole class instruction (i.e., lecturing to the entire class) can be an effective practice depending on the learning goals (e.g., memorization of formulas, vocabulary, etc.).

There are a variety of ways one can reduce overcrowded classrooms. Such methods include increasing the numbers of qualified teachers, increasing/improving facilities, and adding additional resources to supply the new facilities. The costs of taking such actions, just at the primary level, however, are exorbitant. UNICEF estimates that the recurrent expenditures on primary education will have to increase by over \$6.9 billion per year in order to achieve EFA by 2015. Not included in this figure are the many other costs associated with reducing class sizes, such as capital costs (e.g., school construction/improvements) and teacher training. With these factored in, the total cost of reducing class sizes within the context of EFA is estimated at \$9 billion annually through 2015. While this represents only .03 per cent of world GNP, to reduce class sizes and achieve EFA would require many South Asian countries, for example, to increase education expenditures by nearly three per cent annually, while many sub-Saharan Africa countries would require more than a four percent increase. Delamonica et al (2001) express the magnitude of these financial problems similarly: “Currently sub-Saharan Africa and South Asia account for one fifth of recurrent spending on primary education in developing countries; but they account for nearly 60 per cent of the global shortfall for achieving universal basic education of good quality (pg. 60).”

Given the financial improbability that governments in developing countries will be able to bring about reductions in teacher/student ratios in the near future, one must then move to practical questions of how to cope with large classes. That is, if we accept that large classes are currently irreversible, one must then develop strategies that take into consideration financial and technical realities. Are there ways to cope with large class sizes through less resource-dependent means?

Methods Used to Cope with Large Class Sizes

While few methods to teach in large classrooms have been systematically used (i.e., trained and then evaluated for effectiveness) in the developing world, there are a number of education projects addressing these conditions through in-service teacher training efforts. These efforts have not been undertaken through projects specifically designed to address large classrooms, but rather through project implementers who find themselves faced with large classrooms and teachers who are asking for help dealing with the many problems they confront in large classrooms. Anecdotal evidence reveals a list of potential teaching practices that have been recommended as potentially effective. These include:

- Use of small groups
- Pupil-to-pupil support and mentoring
- Effective use of existing space (i.e., largest classes in largest rooms)
- Using the most effective teachers in the larger classes
- Use of volunteers and teachers' aides
- Team teaching
- Shift instruction

Pasigna (1997) captures similar information in her informative guide to managing large classrooms. Her suggestions can be organized into three categories: groupings; classroom management; and remedial/enrichment activities. Pasigna stresses that the strategic grouping of pupils is fundamental to teaching in large classrooms. She suggests that when class sizes swell and new or difficult information is being taught, it is best to break the class into groups of 15 to 20 pupils. Teacher-led instruction will occur at the small group-level, during which the other groups are given practice exercises on the previous day's lesson that they can do themselves without the teacher. In order to familiarize pupils to group work, Pasigna suggests they be assigned to small groups (e.g., from 5-7 pupils) on a regular basis. Within these groupings, all pupils should be given opportunities to lead the group, thereby ensuring that there will be any number of pupils that can help the teacher lead group-based exercises.

Classroom management represents a sizable obstacle to many teachers. To those who teach in classes with 50-100 students, managing the learning process can become quite difficult. Pasigna suggests several methods to effectively manage a large classroom. Her first suggestion is to establish simple rules for acceptable group behavior. Such behaviors include: how to speak softly; how to take turns; how to work together. Additionally, certain classroom chores can be routinized, including how to enter and leave the classroom when classes start, at recess and when classes end; how to assist in handing out books, paper and other materials; how to pass materials to the front and then to the teacher; and how to keep the classroom neat. In performing these tasks efficiently, more time can be spent on instruction and school assignments, rather than on managing disruptions.

In any classroom, there are different ability levels that must be accommodated through remediation and/or enrichment activities. Pasigna offers suggestions on organizing remedial and enrichment activities to suit diverse student needs. She suggests that students in need of remediation should be placed into small groups, if not into pairs. Those students with similar needs (e.g., reading remediation) should be grouped in homogenous groups or pairs (i.e., similar ability levels).

In all cases, not only with remediation/enrichment activities, teachers should make use of other persons to help in the classroom. Pasigna stresses that the teacher is not the only person who can provide tutoring services. Teachers should be able to call upon community volunteers, retired teachers as well as students from higher grades as well as recent high school graduates to assist with enrichment activities.

In each of these cases, it is important to note that these methods have not been systematically used or tested. That is, little, if any, evaluation has been conducted on the effectiveness of these methods. Evaluations are essential in determining which practices are the most effective in improving academic achievement. Funds devoted to rigorous evaluations (e.g., randomized

control trials) of teaching practices in large classrooms would go a long way to providing evidence as to what works in large classrooms, thereby improving educational quality in many developing countries.

While the research on large classrooms can be equivocal, classroom observations reveal that when teachers face 60 to more than 100 students in low- resourced classrooms, teaching and learning suffer. Given the exorbitant costs associated with reducing class sizes, as well as increasing demand for education, innovative solutions are required. To be effective, such innovations should focus on both teaching practices (i.e., training teachers how to teach in large classes) and systemic issues (e.g., lack of qualified teachers, low teacher salaries, inadequate school structures).

Promising Practices

As stated through out this paper, the research is sparse as to effective teaching methods in large classrooms in low-resource settings. However, based on the literature cited above and anecdotal evidence, the following additional methods may have potential in improving teaching and learning in large classrooms.

- **Supplying low cost (perhaps locally made) teaching and learning materials.** This approach is often rejected because it is considered unsustainable. There is research, however, to support the positive impact of learning materials on learning outcomes. It is suggested that supporting teaching and learning supplies via donor inputs for a length of time (5 to 6 years) may be worth the return (Luben et al, 1996). Among such resources could be supplying a textbook for every 1-2 students (Mohammad and Kumari, 2007; Oakes & Saunders, 2004).
- **Training teachers in the use of Whole Class Instruction.** Whole class instruction, also known as *direct instruction*, is a method of teaching the same material simultaneously to the entire class. This approach is teacher-centered and most commonly includes explaining, lecturing or recitation. While many argue that small groups are the most effective way to teach large classes, little work has been done on helping teachers understand how to most effectively use Whole Class methods. Under certain conditions Whole Class instruction may be a more effective method, particularly when lessons require lecturing, recitation, etc. (Bauman, 1984; Stevenson & Lee, 1995).
- **Creating the efficient use of classroom space.** Several USAID and UNICEF projects have focused attention on the effective use of classroom space. Moving desks so to improve small group work and reduce crowding have proven particularly effective. UNICEF has worked with teachers to employ students in an examination of classroom space. In addition to providing training with community research, it additionally provided needed data in the improvement in the use of classroom space (c.f. [UNICEF - Teachers Talking](#)). Under USAID's BESO II project, contractors and Ethiopian teachers developed guidelines for the effective use of classroom space. The team suggested that the most important element is to select a classroom arrangement that is consistent with learning goals and instructional objectives. If the instructional approach calls for cooperative work, the classroom can be arranged with clusters of students. For pair work, students can remain at their desks. It is important to try different configuration for different instructional strategies. In USAID's YALA project in Yemen, staff have begun

constructing multiuse rooms adjacent to schools. These rooms function as both community centers but also classrooms. As classrooms, special attention has focused on using light weight furniture that would allow the various configurations the room may require, be that for meetings, whole class instruction or group work. Further research should examine the effective use of space in large classrooms.

- **Assuring more curriculum support and time-on-task for reading, writing and other language skills.** Reading and language skills are the key to on-going learning, and students in large classrooms do not receive sufficient time to acquire these skills. Curriculum revisions and teacher training in these areas could have important impacts on learning outcomes. Furthermore, teachers could be provided support through the use of aides to handle time-consuming administrative duties, such as taking attendance and collecting assignments, for example. With an increased division of labor within the school, the teacher could be provided more time to focus on instruction.

CONCLUSION

The purpose of this paper was to document the impact of large class sizes in the developing world and to suggest instructional methods that can be used in such settings. Through a combination of rapid population growth and the push for compulsory and free education, many governments and school systems struggle to meet this new demand. In most cases, this has proven difficult, the result being drastically increased student enrolments. While the research on learning outcomes in large classes is equivocal, observational and comparative data reveal that while learning can occur in such settings, the quality and quantity of teaching and learning tends to be much lower in comparison to their peers in smaller classes. There are a variety of obstacles that emerge within large classrooms that can negatively impact teaching and learning. Facing large classes, teachers find it difficult to differentiate their instructional methods, that is, cater to the needs of individual students. The sheer number of students, each with different needs, makes such personalization difficult. Furthermore, within such crowds of students, teachers tend to require more time for classroom management at the expense of teaching.

This being said, there are methods practiced in other contexts that could be replicable in these settings. This paper has helped to define methods that may mitigate the negative consequences of large class sizes. While little has been systematically implemented or evaluated, based on the literature presented here and the experience in other contexts, there are a number of different techniques that could be wrapped up into larger education reform projects. Among these techniques is the effective use of pre-service and in-service teacher training focused on large classroom instruction. Additional promising practices include the use of teachers' aides, innovative use of classroom space, routinizing student behaviors, training students as peer tutors, and training teachers in the effective use of whole class instruction. While large classrooms appear to be an inexorable feature of the developing world, it should not be assumed that the substandard teaching and learning that occurs there cannot improve. The solution lies in building the capacity of teachers and school leaders to cope with this environment and to find ways for students to succeed.