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National center for Educational Research and Development (NCERD)

COST AND COST-EFFICIENCY ISSUES: MINISTRY OF EDUCATION (MOE) SCHOOLS

by

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Executive Summary: Efficiency Issues and Estimates

This monograph explores the efficiency of the Ministry of Education schools in Jordan. The primary focus will be on areas where the most gains can be made. Processes are examined for their potential to be done cheaper or to be done better. "Better" is defined in very narrow terms - often achievement scores.

Only two types of categories make significant differences when efficiency gains are implemented for the MOE - general education and salaries. This is where the vast bulk of expenditures occur. Thus, this study focused on three areas for investigation of (1) administration, (2) general education, and (3) salaries.

Efficiency Issues

Administration

As an expenditure category for the MOE "administration" means central and regional offices and associated personnel. School administrative operations are budgeted under "general education." Of the largest expenditure categories, administration ranks second only to general education when ranked with activities. As a percent of the recurrent budget, administration hasn't changed much from 1982 levels - but it should have. Administrative costs should have shrunk relative to other educational expenditures. The cost of administration relative to other types of costs, should decrease as a system grows larger.

General Education

Expenditures in general education are closely tied to expenditures on salaries. Ninety eight percent of expenditures in general education go to salaries and allowances. The issue of numbers and spread of staff is discussed in the next section.

Achievement

What makes for high achievement and what does it cost? In order to investigate this issue, a regression was run on the results of three types of achievement tests: Arabic, Science and Math .

Factors significant for each achievement test vary widely among Arabic, Science and Math tests. Among the categories of factors, only teacher-related variables seem to be important for all tests. Average years of teacher experience significantly affected test scores in all three subjects. Years of teacher education was also significant for Arabic and Math.

The average years of services of teachers in the school was positively related to repetition rates - the more experienced the teachers, the higher the repetition rates. The cost implications of these teacher-related variables can be found in the following section "Teacher Efficiency."

Classroom Size

Classroom size is not always decided by policy. Size of the school and location of the school may require that a school remain small. The possibility that classroom size can be increased was investigated here. Classroom size is closely related to the total size of the school as Table 7 shows. Fully thirty percent of the schools have classroom sizes averaging 20 students or less. Classroom size is also related to the relative isolation of the school. Given the relatively small

size of the schools and the isolation, it is likely that classroom size is a function of necessity rather than inefficiency.

However, a group which might be able to increase classroom size is those schools with classrooms averaging 21 to 35 students. For many of these mid-size classroom schools, it is likely that maximum classroom size has already been reached - perhaps classes for some grades are small, or just large enough to require splitting into two classrooms. Nevertheless, at least some these schools could, perhaps, increase their classroom sizes.

School Fragmentation

One of the biggest inefficiencies in the MOE system is the fragmentation of schools.[1] The system as a whole has a larger percentage of schools which offer only some of the grades for basic education. Many schools offer only a few grades. The primary problem here is wastage of resources.

One measure available through the MOE EMIS data system is a listing by schools of grades offered to males and females. A "fragmentation index" was constructed which shows the average number of schools offering a grade. The numbers were derived at the "zone" level[2] and averaged for each directorate.[3] It is probably informative to try and turn these very general estimates of fragmentation into some measure of inefficiencies, and, thus, into possible gains.

If modest reductions in fragmentation were to reduce the numbers of schools needed by 10 percent, then administration and teacher salary expenditures would be reduced appreciably.

Teacher Efficiency

A third strategy is to increase the number of class periods that teachers teach. If workloads are not associated with achievement nor with structural factors such as location of the school (nor with size per se), likely workloads could be increased.

Much can be saved by raising teacher workloads across MOE schools. By looking at workloads on a school-by-school case, it is likely that some modest system-wide changes could be realized with substantial savings.

1 For a more complete discussion on this topic, see Ahlawat, Kapur (November, 1991) *Analysis of School Size and Grade Structure in the Public Schools of Jordan: Policy Implications.* Amman: National Center for Educatonal Research and Development.

2 A small area within a directorate.

3 See technical notes for a description of how these were derived. Also see annex for a listing of offerings by zone.

Conclusions

The four primary areas of inefficiencies discussed above involve, primarily, fine-tuning a generally efficient system. Table I summarizes these cost savings.

TABLE I

Summary of Cost Savings Due to Efficiency Gains

	Low Scenarios		Medium Scenario		High Scenarios	
	Amount Saved	% of total MOE Budget	Amount Saved	% of total MOE Budget	Amount Saved	% of total MOE Budget
Administration	59 280	.05%	79 040	.08%	98 800	.10%
Classroom Size	364 682	.35%	729 365	.71%	1 830 293	1.78%
Fragmentation	7 293 648	7.09%	7 637 688	7.4%	9 495 504	9.23%
Teacher Workloads	3 374 120	3.28%	6 748 240	6.56%	10 122 360	9.84%
Totals	11 091 730	10.78%	15 194 333	14.77%	21 546 957	20.85%

Executive Summary: Cost Recovery in MOE Schools:

Instituting a policy of fee collections based on individual benefits or on ability to pay would represent a fundamental change in educational policy for the country. By far, the easiest means of having individuals pay for the benefits they accrue from government sponsored education is to raise the base level of fees (or "contributions") requested of each student.

In order to assess the ability to pay fees, a small study was conducted. The object was to predict school participation based on school fees controlling for several family factors known to affect school participation. As such, a questionnaire was devised that asked for information on entire families relative to the amount spent on schooling and the educational participation of each child.

Fee Increase Options

Flat Fee Increases

In order to assess how school fee increases would affect school participation of groups based on family wealth (usevalue), sensitivity analysis was undertaken. Various fee levels were assessed for each income group. The most striking result is that poorer groups are much more sensitive to price changes in school (demand is more elastic in economic terms). Changes in fees will affect the poorer groups first. A fee of 6.3 JD, for example, means less than a one percent change in school participation in the wealthier families, but will result in an estimated four percent change for the poorer families.

At current rates (7.65 JD - reflective of higher fees reported in grade 12), participation remains unchanged. A reduction in fees would increase participation - especially for poorer groups. Overall participation for the sample is 75 percent - approximately equal to participation rates observed in the total population. Participation rates vary widely, however, by income. If fees were changed (all other factors being held constant and at mean levels), different ages would be differentially affected as to participation rates. This indicates that, were fees to be raised, drop-outs would occur predominantly among older students, not just exclusively among the poor.

Variability by Income Group

Varying fees according to ability to pay (i.e. by income) is more strictly equitable although it would, no doubt, involve more administrative time and energy. This section explores the possibility of varying fees by income group. The gain in revenues is slight - only .9 percent in the best case.

Variability by School

One alternative to creating variable fee rates applied on a student-by-student basis is to assign schools a given category and to encourage principals to collect fees according to a given scale. In order to explore this possibility, schools were grouped according to an income proxy grouping for the school. Each of these school groups could be given different fee scales. In order to gauge where these fees ought to be established, sensitivity analysis was applies.

This fee scale would result in an estimated collection of 4 603 327 JD, or about 3.2 percent of the MOE budget (up from 1.8 percent). This is slightly more than any of the per-student variable scenarios and represents, perhaps, an administratively easier system to implement and maintain.

Variability by Level

Another option is to vary fees by level of schooling. Essentially, Jordan has identified the first 10 years of schooling as critical and has instituted policies designed to see that attendance in these grades is as close to universal as possible. Education beyond these levels is considered optional. Fees for secondary education, then, could possibly be raised much higher than they are today. Table 14 shows the revenues that would be generated by raising secondary schools fees for various levels. Even fairly large increases would not generate much additional revenue - only an addition .4 percent of MOE expenses.

Variability by Urban/Rural

Sensitivity analysis revealed different sensitivities to school fee changesfor urban and rural schools. Using these results, a scenario was constructed that would maintain, overall, the same level of school participation while approaching equality of urban and rural dwellers. While it is never ideal to have any participation rates fall (urban or rural), today's participation rates can be maintained (or even slightly improved) while generating considerably more revenues. Also, equity is enhanced as both urban and rural dwellers face the same propensity to attend schools. This scenario generates about 3.6 percent of MOE expenditures.

Conclusions

Impact by Fee Structures

From a purely economic perspective, a more logical option would be to introduce variable fee scales. Certainly, some families have more ability to pay than others. A system of variable fees could be designed so as to generate some additional revenues (albeit modest) and to make the opportunity for schools slightly more equitable. By raising fees for those who can generally pay, lowering expected fees for those who have less ability to pay, children of poorer families will have slightly increased chances of staying in school longer while the government passes on some of the costs to those most able to bear them.
Table I summarizes the options explored here for variable fee rates.

TABLE II
Summary of Variable Fee Options Revenue Generation

Variability Applied to...	Additional Revenue Generated (JD)	Additional % of MOE Budget Funded	Total Revenue Generated (JD)	Total % of MOE Budget Funded
Current Fees	0	0%	2 819 446	1.89%
Income	1 329 920	.89%	4 149 367	2.78%
Schools	1 783 881	1.19%	4 603 327	3.08%
Level	630 320	.42%	3 449 767	2.31%
Location	2 604 504	1.71%	5 423 951	3.60%

Impact on Instructional Materials

Another possibility is to allow schools to retain the additional fees and use them for purchasing instructional materials. Since very little in the general education budget is designated specifically for materials and supplies, most such items are purchased out of the revenues obtained through fees. Table III shows how such an increase would impact moneys available for materials and supplies. Moneys available for such items would increase by 65 percent.

Table III
Impact of Increase Fees on Material and Supply Moneys

Source of Funds	Funds Available in JD
MOE Budget	248 000
Education Tax	5 000
Current Fees	2 819 446
Additional Fees	2 000 000
% increase over current expenditures	65%

Impact on Small Schools

Small schools are at a disadvantage when it comes to the purchase of additional materials, supplies and equipment when these funds are supplied through fees. Small schools frequently find that they cannot make purchases for necessary equipment in particular. Sensitivity analysis was performed on the basis of school size to ascertain what impact increased fees would have on each size-group of schools. Two possibilities for fee distribution were explored and contrasted: (1) distributions as they currently stand where schools retain fees paid by students, and (2) distributions whereby the suggested increase in fees were distributed on a per-school basis. Table IV shows the impact of both distributions.

TABLE IV

Average School Size by Classroom Size

	Current Distribution			Distribution Favoring Small Schools		
Group	Additn'l Fees p/school school	Total per school	Percentage Increase	Additional Fees p/school	Total per school	Percentage Increase
1	127	312	69%	869	1054	469%
2	353	670	112%	869	1185	275%
3	630	1108	132%	869	1347	182%
4	1160	1948	147%	869	1657	110%
5	1690	2788	154%	869	1967	79%
6	2546	4145	159%	869	2468	54%
7	3800	6132	163%	869	3201	37%
8	5170	8303	165%	869	4002	28%
9	6252	10024	166%	869	4640	23%

If fee increases were distributed on a per-school basis, smaller schools would receive about 1054 JD annually - a 469 percent increase. Their total revenues would still be considerably smaller than larger schools, as they should be. But they would be given enough funds to make major purchases that all schools need.

Executive Summary: Long-Term Recurrent Costs of the Education Reform

In 1989, Jordan instituted implementation of an educational reform. The implementation of the reform was to cover a ten year period beginning in 1989 and ending in 1998. It is estimated that the gulf crises set back full implementation about two years. The reform was to cover seven major areas:

- Basic and Secondary School Curriculum Development
- Textbook Development
- Teacher and Supervisory Staff Training
- Educational Technology Additions to Schools
- Educational Facility Improvement
- Vocational Training Expansion
- Educational Research and Development Capacity Building

Essentially, the cost of the reform will accrue to four parties: The Ministry of Education, the public universities, the Vocational Technical Corporation (VTC) and The Royal Scientific Society (for establishment of the National Center for Educational Research and Development). Private expenditures will also be incurred as tuition is paid for additional participation in MOE schools, VTC centers, and at the universities (for teacher training).

Cost to the Ministry of Education

Teacher and Supervisory Staff Training

Certification of Basic Education Teachers

In 1988, only 32 percent of Basic teachers had qualifications of at least a B.Sc. degree. By the end of the reform, an expected 66 percent will have such a qualification. Since teachers who are more qualified command a higher salary, annual costs of maintaining the teaching staff will increase even if total staff size were to remain the same. One average, a per teacher cost of JD 153 is expected as a result of new certification levels. Total annual MOE costs of maintaining this staff would be just over five million JD.

Upgrading Secondary Teachers and Supervisors

The average annual increase in wages due to this upgrading is 498 JD. Teachers will see a 475 JD increase while supervisors will see an average increase of 531 JD. Total costs are estimated at 3 040 884 JD annually - 56 percent of which is due to the teacher upgrading and 44 percent due to supervisor upgrading.

Curriculum Changes

Three long-term structural changes will occur as a result of curriculum changes. New textbooks are being distributed. A new warehouse for textbooks is anticipated. Finally, the Curriculum Department has added 50 additional staff. Warehouse maintenance costs will be new - an estimated 10 846 JD annually. New curriculum staff currently cost the MOE about 120 000 JD per annum.

Educational Technology

Two types of facility improvements were to be made under the reform. The primary change was to add a substantial number of student places by building new schools or adding facilities to existing schools. This is discussed below in the "Educational Facility Improvement" section. The second change was to add specific facilities and equipment termed "educational technology." Specifically, this involved adding science labs, storage rooms or multi-media equipment and libraries and workshops. Long-term recurrent costs involve the maintenance and replacement of these facilities and equipment. An estimated 331 250 JD will be needed annual to maintain these facilities. Maintenance of new furniture - spread over ten years - is about nine million JD annually.

Educational Facility Improvement

A total of 152 schools were to be upgraded in Phase I of the reform (based on data at the time of this writing). The average annual maintenance cost was calculated to be 11 280 JD per school. Furniture and equipment maintenance costs varied by whether the school was getting new or replacement equipment and furniture. Replacements imply that some maintenance costs are already built into the budget and need to be increased. The average is about 2 200 per school. New equipment and furniture was calculated at an average annual maintenance cost of 11 000 JD.

Extending Basic Education to Include Grade 10

The most fundamental change caused by the reform is the inclusion of Grade 10 into the Basic cycle. Ten grades are now required for school completion. This represents a long-term recurrent cost to the system. Between 1988 and 1989, student enrollments for Grade 10 were 22 percent higher than expected growth would have accounted for. The marginal cost to the system of the additional grade 10 students was calculated to be a 1.47 percent increase. This translates into an annual additional cost of 1 493 520 JD.

Cost to Public Universities

Two types of additional expenses will accrue the public universities. First, new facilities are being constructed and equipped for teacher training. These will require maintenance and replacement. Second, additional students will be admitted. Once fully completed, annual maintenance costs on new university construction will be approximately 143 183 JD annually. Maintaining new equipment and furniture will cost 502 942 annually.

To date, approximately 1500 teachers are receiving additional education as a result of the reform. Costs are estimated to run about 6.5 million JD annually.

Cost to Vocational Technical Corporation

The Vocational Technical Corporation will have opened three new centers and expanded a fourth by the end of the reform. Three types of long-term recurrent costs will be incurred: maintenance of new centers, cost of additional students, and replacement/repair of equipment put in place. The construction costs amount to just over 3 million JD and cost an annual estimated 60 776 JD to maintain. Maintaining the furniture and equipment - amortized over a much shorter period - costs 225 461 JD. The annual additional costs of educating an estimated increased number of students is just under one million dinars per year.

Establishment of the National Center for Educational Research and Development

In 1990, the National Center for Educational Research and Development (NCERD) was established in accordance with the dictates of the reform. Although the NCERD is very involved in aspects of the reform (i.e. in its evaluation), the intention is for the Center to remain in the long run. The annual cost to the HKJ government is 187 404 JD.

Table 11
Estimates of Long-Term Annual Recurrent Costs of the Reform

	Cumulative Annual Phase I + Phase II	Phase I Total Costs	% Com-plete	Costs Already Absorbed	Costs to to be absorbed Phase I	Additional Estimated Phase II Costs	Long-term costs not absorbed
Total MOE Annual Costs	**17 285 741**	**9 203 145**		**4 838 282**	**4 364 863**	**8 082 596**	**12 447 459**
Public Universities							
Maintenance of New Buildings	143 183	143 183	13%	18 041	125 142	0	125 142
Additional Students	6 474 738	6 474 738	100%	6 474 738	0	0	0
Equipment Repair & Replacement	502 942	502 942	0%	0	502 942	0	502 942
Subtotal	***7 120 863***	***7 120 863***		***6 492 779***	***628 084***	***0***	***628 084***
Vocational Technical Corporation							
Maintenance of New Buildings	60 776	60 776	23%	14 161	46 615	0	46 615
Additional Students	987 027	987 027	5%	46 390	940 637	0	940 637
Equipment Repair and Replacement	225 461	225 461	5%	10 597	214 864	0	214 864
Subtotal	***1 273 264***	***1 273 264***		***71 148***	***1 202 116***	***0***	***1 202 116***
Nat'l Cntr. for Educational Res. and Dev't	***187 404***	***187 404***	***100%***	***187 404***	***0***	***0***	***0***
TOTAL LONG-TERM ANNUAL COST OF REFORM	**25 867 272**	**17 784 676**		**11 589 613**	**6 195 063**	**8 082 596**	**14 277 659**

EFFICIENCY ISSUES AND ESTIMATES

Background

If education were an industry, a rather obvious question to asked would be how efficiently it was run. Any inefficiencies that could be identified and eliminated would turn into instant increases in profit. Obviously, profit is not the goal of public education, but a related concept is useful - how to use existing resources as efficiently as possible. For Jordan, squeezing the most education out of existing resources is an important goal. With a high population growth rate, internal and external pressures to decrease government expenditures, and an increasing demand for education by the public, budgetary pressures on the Ministry of Education are enormous.

This monograph will explore the efficiency of the Ministry of Education schools in Jordan. The primary focus will be on areas where the most gains can be made. But before this exploration can begin, it is important to define efficiency in an educational context.

An efficient system is one that uses resources optimally. Increasing efficiency usually means either finding ways to obtain existing outcomes using fewer resources, or to use existing resources to obtain increased outcomes. As mentioned above, if education were an industry, these outcomes would be profits. Education, however is a complex and interactive system where a variety of goals are pursued simultaneously. Whereas the major focus is often on achievement scores, it is tacitly recognized, for example. that attaining increased scores at the sacrifice of student health (mental and physical) or by destroying strongly held social values is not acceptable. Further, broader educational goals are pursued at the same time as raw achievement: problem solving, strategies for learning, socialization to group goals, recognition of individual strengths and creative thinking are all important outputs of a good school system.

As with any complex system, the various goals overlap and are interactive. Reduction in one may affect others which, in turn, affect others. Thus, defining an output - the first step in pursuing efficiency - is a messy business in education. Economists overcome this problem by making simplifying assumptions. The most obvious is the assumption that various goals are not interactive. That is, in pursuing (or emphasizing) one goal, others are not affected. Another important assumption is that goals which cannot be measured (or measured easily) are not too important. Thus, preserving (or enhancing) self-worth takes a back seat to the goal of increasing a math score.

A final assumption is important is what is known as "external" efficiency. The assumption is that the larger social goals of education are obtained when much narrower educational goals are achieved. Since publicly financed education is suppose to enhance the good of the larger society, a true measure of education's efficiency would be whether it enhanced social welfare. In fact, given education's long time horizon (years to educate and then years in which the benefits are accrued), its numerous effects (productive capacity, social adaptation, personal growth), and its synergistic nature (an individual's education benefits herself, her family, her community and her society), it is difficult to measure education's external efficiency. Attempts to measure only the productivity gains overlook other gains and losses associated with a concentration on productivity.

This monograph makes use of these assumptions. Processes are examined for their potential to be done cheaper or to be done better. "Better" is defined in very narrow terms - often achievement scores. Education's relationship with larger social goals is not questioned. Nevertheless, within these fairly tight strictures, efficiency can be examined. Some types of processes, inputs and outputs can be fine-tuned to get more "education" out of scarce resources.

Overview

If the goal of pursuing efficiency is to spend resources more wisely, then it makes sense to concentrate on areas where the most resources are used. After all, a large efficiency gain on a relatively small expenditure area will not reap many rewards. Table 1 is a simulation. It shows how much would be saved by a ten percent efficiency gain in various MOE activity areas. Table 2 makes the same simulation, but on expenditure categories.

TABLE 1
Simulation of Ten Percent Efficiency Gains in MOE Activities

	Amount Saved (JD)	MOE Current Budget Percent Decrease
Administration	575 500	.57%
General Education	601 000	8.47%
Vocational Education	245 100	.24%
Social & Sport Activities	98 300	.10%
In-Service Training	82 200	.08%
General Exams	163 800	.16%
Curriculum and Texts	376 100	.37%
Adult Education	18 000	.02%

TABLE 2

Simulation of Ten Percent Efficiency Gains in MOE Expenditure Categories

	Amount Saved (JD)	MOE Current Budget Percent Decrease
Salaries and Allowances	9 115 800	9.03%
Rents	22 800	.02%
Utilities	88 500	.09%
Maintenance	23 550	.02%
Materials and Supplies	440 350	.44%
Other Services	226 700	.22%
Transportation	171 200	.17%

Only two types of categories make significant differences when efficiency gains are implemented - general education and salaries. In fact, these two categories are highly related because much of the General Education budget is salaries and allowances. A third area, that of administration is also examined briefly in this work. Administration spans a number of areas and may, in fact, have a somewhat larger effect than is immediately obvious from the above simulation. Thus, this study will focus on three areas for investigation of areas where efficiency gains could be made.

- Administration
- General Education
- Salaries

Clearly, if any substantial moneys are to be saved, savings must be directed at one of these three categories. The balance of this monograph will look at efficiency issues embracing these three larger areas.

Efficiency Issues

Administration

As an expenditure category for the MOE "administration" means central and regional offices and associated personnel. School administrative operations are budgeted under "general education." Of the largest expenditure categories, administration ranks second only to general education when ranked with activities. Gains made here are unlikely to yield substantial gains in and of themselves, but could be part of a larger picture of savings.

As with all educational activities, administration should, ideally, be viewed as a process rather than a product. The primary question, then, is how does one make the process of administration more efficient. Ideally, efficiency in administration would come from a careful study of the processes involved. Such a process study is beyond the scope of this work, but some clues as to possible administrative inefficiency is possible.

Table 3 shows the percentage of current MOE budget spent on administration in the comparison years of 1982 and 1988 to 1992.

TABLE 3
Percentage of Current Budget Allocated to Administration

	% of Current Budget
1982	5.8%
1988	5.5%
1989	6.4%
1990	6.2%
1991	5.9%
1992	5.7%

As a percent of the recurrent budget, administration hasn't changed much from 1982 levels - but it should have. Administrative costs should have shrunk relative to other educational expenditures. The explanation involves the difference between marginal and average costs.

Without students, education should cost nothing. But the first student is very expensive - a teacher must be hired, a building built, learning materials purchased, an administrative structure put in place. As the number of students increase, each of these "input" must also increase, but not equally. One teacher must be added for each 30 students but the learning materials used for the first student can now be used for a classroom. Administrative costs do not grow as fast as others. Once, for example, a payroll department is in place, large numbers of students and teachers can be added before the payroll department needs to be expanded. The statistics department need not increase with each new student, teacher or school, either. The programs written, the statistics generated remain the same no matter what the size of the school system. Only data entry and validation increases. The marginal increase in administrative expenditures is much smaller than the average cost. As the system enlarges, the relative size of administration should decrease.

The cost of administration relative to other types of costs, should decrease as a system grows larger. What the size of the decrease should be is system specific and depends upon the complexity of the system (how many schools, how easily accessed, ease of communication, etc.). The fact that the MOE administration budget has remained relatively unchanged as a percent of the total current budget is a likely indicator of inefficiencies.

General Education

General education involves expenditures by academic schools on learning activities. Textbooks are excluded from this general expenditure category as are activities related to, but not specifically part of, academic learning such as in-service training of teachers and social and sports activities.

Expenditures in general education are closely tied to expenditures on salaries. Ninety eight percent of expenditures in general education go to salaries and allowances. The issue of numbers and spread of staff is discussed in the next section.

Students

Achievement

As mentioned earlier, the goals for students are diverse involving personal, social, intellectual, spiritual and practical goals. A primary and explicit goal of schooling is the attainment of high levels of academic achievement. What makes for high achievement and what does it cost?

While a wide variety of attitudinal, perception, support factors emanating from family, peers, community and educators are probably very important here, in terms of resources, it is useful to know what types of resources make for higher levels of learning. In order to investigate this issue, a regression was run on the results of three types of achievement tests: Arabic, Science and Math (See Technical Note 1 for details on the sample).

Table 4 shows the types of variable measured.

TABLE 4

Factors measured for effect on student achievement

AVGSEYR	Average. years of teacher service
CLPRSTU	Classroom space per student.
ELECTRIC	Does the school have electricity? (yes = 1; no = 0)
LIB1	Has a Library but no separate room. (yes = 1; no = 0)
LIB2	Has a separate library room (yes = 1; no = 0)
LOCATION	Urban (1); Rural (0)
MULTIPUR	Is there a multipurpose room in the school? (yes = 1; 0 = no)
OVERHEAD	Do you have an overhead projector in the (yes = 1; no = 0)
PHONE	Does school have telephone? (yes = 1; no = 0)
LABROOMS	Special room for labs? (yes = 1 ; no =0)
SHIFT	One (1) or two (2) shift school?
SPEAKER	Do you have a speaker system in the school? (yes = 1; no = 0)
STUBENCH	Average number of students per bench.
STUPRMNG	Students per manager
STUPRTE	Students per teacher
TAPEREC	Do you have a tape recorder in the school? (yes = 1; no = 0)
TCHRCHAI	Is there a teacher chair in all classrooms? (yes = 1; no = 0)
TCHRDESK	Is there a teacher desk in all classroom? (yes = 1; no = 0)
TECHLABS	Is there a full-time lab technician? (yes = 1; no = 0)
TOTLIB	Number of books in library
TOTSTU	Total # of students in the school
TVSCHL	Do you have a TV in the school?(yes = 1; no = 0)
TYRSED	Teacher years of education
VIDEO	Do you have a video in the school? (yes = 1; no = 0)

Table 5 shows the results.

TABLE 5

Affect on Achievement of Various School Factors (Beta Coefficients)

		Arabic	Science	Math
Teacher Variables				
	Avgseyr	**.54**	**.32**	**.73**
	Stuprte	-.08	-.05	.05
	Tyrsed	**-1.85**	**-1.42**	-.47
School Characteristics				
	Clprstu	-.27	**2.51**	2.05
	Location	**1.07**	**1.51**	-1.13
	Stuprmng	.01	-.01	.01
	Totstu	.00	.00	.00
	Shift	.02	.46	**2.43**
Wealth of School				
	Electric	-1.71	3.39	.82
	Overhead	**1.21**	.72	1.02
	Phone	**-2.66**	-.43	**-2.47**
	Speaker	**1.82**	**2.81**	1.00
	Stubench	**.84**	-.42	.46
	Taperec	.97	.67	.54
	Tchrchai	**.85**	**-2.35**	-.28
	Tchrdesk	.50	2.90	1.42
	Tvschl	**-1.46**	-3.75	-1.52
	Video	1.05	.81	-.54
Learning Environment				
	Lib1	2.42	3.63	.26
	Lib2	.51	4.14	.98
	Multipur	.00	.27	.27
	Roomlabs	**-1.97**	.10	.13
	Techlabs	**.34**	-2.26	.49
	Totlib	**.00**	.00	.00
(Constant)		67.78	55.32	39.79

Coefficients in **bold** are significant at the .05 level.

Two patterns are striking for the purposes of determining what kinds of resources affect student achievement. First, factors significant for each achievement test vary widely. Arabic is affected by 12 factors while science only shows sensitivity to three factors. Very likely this is an artifact of the model - other types of factors are likely to demonstrate considerable effect on achievement that are not measured here.

The second interesting point, is that, among the categories of factors, only teacher-related variables seem to be important for all tests. Among the school characteristics, the size of the school, number of shifts of the school, and classroom space per student (a measure of crowding) seem relatively unimportant. Only the urban versus rural factor is important for more than one subject (Arabic and Science).

Several types of equipment and furniture have been measured here but appear to have only a limited value for student achievement. Clearly, the mere existence of such equipment would not explain much in the way of score differences, but the fact that a school does or does not have such equipment may be indicative of the type of school it is. Nevertheless, schools with substantially more equipment and facilities do not appear to produce higher achieving students with the exception of Arabic.

Not too surprising, the major critical resource are teachers. Average years of teacher experience significantly affected test scores in all three subjects. Years of teacher education was also significant for Arabic and Math. Students per teacher was not an important factor. The cost implications of these teacher-related variables can be found in the following section ("Salaries") under "Teacher Efficiency."

Repetitions

If students learned more with the same amount of resources, efficiency would be increased. Efficiency would also be increased if they learned more quickly. Repeaters take longer to go through the system than do non-repeaters. The more repeaters, the more students. On average, the MOE experiences a very low repetition rate - about one percent for the fifth graders measured in the sample, for example.

In order to determine whether any resource would contribute to lower this small repetition rate, a regression was run on the same resource variables, but this time predicting the percentage of students repeating in the school. Again, the model was run only for MOE schools. Specific results can be found in technical note 2, but, generally, little was found to affect repetition rates.

Of the variables measured, only the achievement levels and the years of teacher experience mattered insofar as repetition rates were concerned. Even where total scores were concerned, the sensitivity of repetition rates to achievement levels was small - a rather large achievement gain school-wide would have to be attained before repetition rates are lowered any appreciable amount.

Rather surprisingly, the average years of services of teachers in the school was positively related to repetition rates - the more experienced the teachers, the higher the repetition rates. Again, the strength of the relationship was rather weak. Nevertheless, this counter-intuitive finding might be explained as more experienced teachers expect more from their students; are more likely to feel confident in failing weak students, or are placed in better quality schools with higher criteria for passing.

Essentially, little in terms of school resources (those measured here) seem at affect repetition rates. Rates are low to begin with and not a major problem for MOE schools. Since rates are low and the relationship between resources and repetition is weak, targeting repetition rates for efficiency improvements is unlikely to yield much gain.

Classroom Efficiency

If the classroom unit could function more efficiently, the learning processes would cost less. Since a major cost of running a school is the cost of staff salaries, any increase in class sizes would mean more students were being served by the same number of teachers. According to the statistical results cited above, classroom size, per se, does not seem to affect achievement, so increasing classroom size seems a logical place to increase efficiency.

Unfortunately, classroom size is not always decided by policy. Size of the school and location of the school may require that a school remain small. In the case of Jordan, what has become known as "school fragmentation" is a relevant and related issue (discussed in next section). Irrespective of school fragmentation, the possibility that classroom size can be increased was investigated here.

In order to investigate this issue, students per classroom were divided into nine groups:

TABLE 6
Grouping by Students Per Classroom

Group	Students per Classroom
1	1-10
2	11-15
3	16-20
4	21-25
5	26-30
6	31-35
7	36-40
8	41-45
9	46+

Classroom size is closely related to the total size of the school as Table 7 shows. Fully thirty percent of the schools have classroom sizes averaging 20 students or less.

TABLE 7
Average School Size by Classroom Size

Group	Mean No. of Students	No. of Schools	Percent of Schools
1	23	121	5.3
2	64	298	12.9
3	114	306	13.3
4	210	366	15.9
5	306	535	23.2
6	461	327	14.2
7	688	212	9.2
8	936	115	5.0
9	1132	22	1.0

Classroom size is also related to the relative isolation of the school. Table 8 shows that schools with small classroom sizes are relatively isolated from other schools. This data was taken from the NCERD's reform evaluation sample of 205 MOE schools (other schools were included in the sample but are not used here).

TABLE 8
Distance to Nearest School for Schools of Various Classroom Sizes

Group	Kilometers to Nearest 1st Grade School	Kilometers to Nearest Secondary School
1	6.5	9.6
2	1.2	8.7
3	.4	4.5
4	.5	3.4
5	.9	4.5
6	.6	3.3
7	.7	1.4
8	.5	.9
9	n/a	n/a

If the sample data is a good representation of the general population of MOE schools, schools with small classroom sizes are often quite isolated. Of course, what really matters is how far the school is from the school with the same grades and gender. But distance to nearest first grade and nearest secondary school are a good proxy for relative isolation of the school.

Given the relatively small size of the schools and the isolation, it is likely that classroom size is a function of necessity rather than inefficiency. That is, assuming that access to school is an unequivocal goal of the government, small classroom size is likely a necessary condition for at least some schools. In order to establish this, schools where classroom sizes were less than 21 students were looked at separately. Table 9 shows that the size of the schools are small for all of these schools. In fact, only one of these schools had more than 275 students.

TABLE 9
Number of Students in Schools with Small Classroom Sizes

Decile Group of School Size (Number of Students)	Size of School (Number of Students)
1	5-20
2	21-33
3	34-39
4	40-53
5	54-67
6	68-80
7	81-94
8	95-116
9	117-156
10	157-380

The evidence would suggest that nearly all the schools with small average classroom sizes have low enrollments. Unless grades were mixed together, it is unlikely that these schools can increase their classroom size. A more likely group to be able to increase classroom size is those schools with classrooms averaging 21 to 35 students.

For many of these mid-size classroom schools, it is likely that maximum classroom size has already been reached - perhaps classes for some grades are small, or just large enough to require splitting into two classrooms. Nevertheless, at least some these schools could, perhaps, increase their classroom sizes. Table 10 shows the average efficiency gained if some of these schools could increase average classroom size to 35 students per classroom:

TABLE 10
Simulation of Increases in Classroom Size for Classrooms with 21-35 students. (Increases to 35 students)

Percent of Schools Which Would Increase in Classroom Size	Reduction in number of Classrooms	Percent Decrease in Total Number of Classrooms (All MOE)
10%	171	.53%
20%	343	1.06%
30%	514	1.59%
40%	685	2.66%
50%	857	2.12%

School Efficiency

One of the biggest inefficiencies in the MOE system is the fragmentation of schools. [4] The system as a whole has a larger percentage of schools which offer only some of the grades for basic education. Many schools offer only a few grades - often somewhere in the middle of the basic cycle. Further, males and females face different schooling opportunities depending upon where they live.

The primary problem here is wastage of resources. When grade offering are disjointed, there will be grades which are not offered or offered at a great distance as well as grades that are duplications. A student may have a school nearby which offers grade 1 - 3. She may have to travel some kilometers for grades 4 and 5 and then travel a different direction for grades 6 through 10. Further, she may have a choice of nearly schools for some of these grades - perhaps two or three schools to choose from for some grades.

The problem in estimating the total efficiencies of their system, of course, is that the extent of the problem varies from location to location. Two types of information need to be known which are location specific: . What is the structure that exists now? and What structure would be optimal? A third question would need to be posed for implementation of any operational issues: How do we get from the existing structure to a new one? Also, in terms of capital outlays and resources, when is it a good idea to completely restructure a location system and when is it best to simply modify what exists? None of these types of information are available. Clearly, some work needs to be done in gathering the information.

Some progress has been made in resolving this problem Once the problem was first identified, a recommendation was advanced that new school construction be minimized while expansion of existing schools be given a high priority. Thus, as new construction is added, the overall fragmentation is gradually reduced. Given that construction was already anticipated and financed, this is a good short-term solution. Nevertheless, a long-term solution needs to be addressed.

Given that little of the types of information exists that would be needed to do a careful estimation of the costs of fragmentation, two strategies were employed here to gain some understanding of the problem.

First, some sample areas were visited to get a picture of the type and extent of fragmentation is specific types of locations. The hope was to be able to use this information as a kind of "baseline" from which to project the extent of the problem elsewhere. Unfortunately, the network of fragmented schools is too pervasive to isolate any specific area. Each school is connected to "feeder" schools and to "dispersion" schools which, in turn are connected to other feeder and dispersion schools.

The exercise did provide some interesting "case studies" however, and a short description follows.

4 For a more complete discussion on this topic, see NCERD document _____ by Ahlwat.

TABLE 11

Fragmentation Case 1:

District: Irbid

Villages Served: 2

School No.	# female students	# male students	grades offered	feeder schools	dispersion schools
1	702		5-12	3 & 4	-
2		597	1-12	5 & 6	-
3	221		1-4	-	1
4	227		1-4	-	1
5		219	1-3	-	6
6		254	3-6	5	2

Essentially, these two villages could be served by schools 1, 2 & 3 if they were large enough to accommodate all students. In fact, the two villages could be served by only two schools - say school 2 and expanded school 1. Instead, several inefficiencies become obvious. First, females have two choices of schools for grades 1- 4. The average grade size is about 50 for each school. Fifty is too large for one classroom and not optimal for two. If the two schools were combined, four classes per grade could become three classes per grade - a cost savings of 25 percent for these grades. Of course, administrative costs would be reduced even more - perhaps close to 50 percent.

Another interesting characteristics is that boys have three choices for grade three. For all other grades they have one or two choices of schools. The triple offering exists only for one gender for one grade. Since a boy going to school five must transfer to either school six or two, there is little point in keeping the overlapping grade - transfers are inevitable.

Although specific structures of each school were not examined, an estimate based on enrollments and grade offerings suggests that about 78 classes exist for the six schools. If no overlaps existed, and estimated 72 classes could be offered - a reduction of eight percent.

TABLE 12

Fragmentation Case 2:

District: Karak

Villages Served: 1

School No.	# female students	# male students	grades offered	feeder schools	dispersion schools
1	202		8-12	4	-
2		420	4-12	3 & 4	-
3		53	1-5	-	2
4	289	72	1-9	-	2

The most interest case here is for male students. For grades four and five, three schools exist. For grades 10 - 12, only one choice exists. For grade 1-3, and 6 - 9, two choices are available. For girls, double offerings exist for two grades - grade 8 and 9. Overall school enrollments are small - about 500 for each gender. One school offers classes for both sexes, although it is not clear if a full range of grades are offered for boys. Clearly, this village needs only two schools - or one with a double shift. With such small populations, distribution of students across grades becomes critical for estimating numbers of classrooms and teachers needed, but if the village were to be reduced from four to two schools, at least some costs would be reduced. Certainly, administrative costs could be halved. Likely teacher costs would be reduced.

Our quick sampling of 16 different locations (from which these two case studies were pulled) indicates that a large amount of fragmentation exists. We examined most closely rural areas where fragmentation is most likely to cause inefficiencies (because of small schools). In some cases, we found areas were entire grades were not offered or where huge distances needed to be covered - especially in accessing secondary schools.

While this sampling of cases gives a picture of the kind of problems faced, our second approach to fragmentation was to derive a quantitative measure of the problem. One measure available through the MOE EMIS data system is a listing by schools of grades offered to males and females. The "fragmentation index" constructed shows the average number of schools offering a grade. The numbers were derived at the "zone" level[5] and averaged for each directorate.[6]

Tables 13 and 14 shows several important measures of fragmentation:

Average number of grades missing. Many zones do not offer some grades. This is an average of the number of grades that are missing for the zones within the directorate.

Average number of grades offered. This is the opposite of "grades missing." This is an average of the number of grades offered for the zones within the directorate.

5 A small area within a directorate.

6 See technical notes for a description of how these were derived. Also see annex for a listing of offerings by zone.

TABLE 13

Fragmentation in Schools with Male Students

Directorate	Avg. no of grades missing (typical zone)	Avg. no. of grades offered (typical zone)	Fragment-ation Index (Schools per grade; typical zone)	Students per grade per zone per school (typical zone)
1	1.47	10.53	3.37	91.51
2	3.81	8.19	2.14	90.19
4	2.96	9.04	3.68	21.95
5	3.78	8.22	2.44	28.14
6	2.40	9.60	4.59	36.83
7	3.75	8.25	2.04	28.79
8	2.89	9.11	2.19	30.73
9	3.00	9.00	1.23	31.14
10	2.74	9.26	2.94	54.73
11	2.00	10.00	1.75	49.94
12	4.19	7.81	1.46	31.25
13	2.83	9.17	2	32.26
14	4.00	8.00	1.68	60.06
15	3.14	8.86	2.63	29.04
16	2.17	9.83	2.1	34.29
17	2.29	9.71	3.84	21.93
18	2.53	9.47	1.82	24.12
19	3.89	8.11	1.72	49.66
20	4.12	7.88	1.49	28.61
21	3.52	8.48	1.15	14.18
22	3.53	8.47	2.08	16.41
23	2.00	10.00	1.74	141.78

Fragmentation Index. The average number of schools offering a grade for the zones within the directorate. This index is weighted for the number of grades offered.

Students per grade per school (typical zone). Some directorates are large and should have many schools per zone that offer a given grade. Hence, this statistics shows how many students, on average, attend each grade offering per school.

TABLE 14

Fragmentation in Schools with Female Students

Directorate	Avg. no of grades missing (typical zone)	Avg. no of grades missing (typical zone)	Fragmentation Index (Schools per grade; typical zone)	Students per grade per school (typical zone)
1	0.44	11.96	3.66	80.54
2	2.68	9.32	1.98	88.08
4	3.00	9.00	2.79	27.27
5	3.00	9.00	2.42	25.97
6	2.37	9.63	4.26	40.24
7	3.72	8.28	1.75	34.04
8	4.00	8.00	1.29	52.37
9	2.43	9.57	1.04	28.27
10	2.65	9.35	2.39	68.21
11	2.08	9.92	1.46	59.15
12	1.35	10.65	1.28	25.22
13	3.38	8.62	1.47	41.43
14	3.58	8.42	1.26	75.38
15	2.41	9.59	2.41	28.04
16	2.69	9.31	1.87	45.49
17	2.27	9.73	3.31	14.42
18	2.69	9.31	1.6	46.29
19	3.94	8.06	1.51	54.11
20	4.40	7.60	1.4	31.15
21	3.65	8.35	1.2	30.38
22	3.13	8.87	1.4	22.54
23	2.67	9.33	1.4	123.53

The tables above demonstrate that a wide variation in the fragmentation and resultant number of students per grade per school in a typical zone. As good example is the comparison of two directorates with respect to male school fragmentation. In zone 21, there are an average of 14.18 students per grade per school and each grade is offered in 3.52 schools on average (within zones). In directorate 1, however, 91.51 students, on average, attend a grade in a school and usually, there are few school overlaps per grade - only 1.47 schools offer any given grade in any given zone.

These figures cannot be turned into reliable estimates of the extent of inefficiencies. Several problems exist. Zones throughout a directorate vary widely and should not be averaged together - rather they should be studied separately. Zones, while acceptable boundaries for administrative purposes, do not necessarily represent attendance demarcations. A child may well face a choice of schools in two or more zones if the child lives near the boundary. Also, summary numbers by directorate average zones together as equals. A weighting by various types of factors might shift the averages.

Irrespective of these restrictions, it is probably informative to try and turn these very general estimates of fragmentation into some measure of inefficiencies, and, thus, into possible gains. Three scenarios were run assuming three types of fragmentation improvements. The results are displayed in table 15.

TABLE 15
Simulation of Fragmentation Improvements

	Fragment-ation Index	Students per grade per school	Avg. school size	Schools needed in a typical zone	% reduction in schools needed
Current Situation	2.66	54.4	519.3	7.73	0%
Scenario 1: If directorates with above average fragmentation reduced fragmentation by 20%	2.35	62.33	591	6.91	10.6%
Scenario 2: If all directorates improved fragmentation by 10%	2.40	60.49	577	6.96	11.1%
Scenario 3: If students per grade per school averaged at least 46 in all directorates	2.29	63.19	602	6.66	13.8%

These types of scenarios serve only to set boundaries on the parameters of the problem. Given very generalized information, a very rough estimate of the inefficiencies caused by fragmentation are large. If, for example, modest reductions in fragmentation were to reduce the numbers of schools needed by, say, 10 percent as the above scenarios might suggest, then administration and teacher salary expenditures would be reduced appreciably. Although the new schools would be larger and might absorb some of the administrative personnel required for the fragmented situation, perhaps a reduction of six percent of administrative costs could be realized.

Not all students could be absorbed into existing schools without some expansion of teaching staff. Nevertheless, this expansion is likely to be less than the staff reductions realized by closing small and redundant schools. Perhaps, teacher salaries could be reduced by four percent as an example.

Fragmentation, once realized, documented and integrated into plans, can be reduced in reasonably easy ways. For example, for any given location, simply reducing overlaps in grades of nearby schools could increase aggregate class sizes and reduce teacher costs per student. As school populations grow, expansion can occur by adding grades to existing schools (as is now being done). The scenarios presented above represent fairly conservative estimates of reductions in fragmentation. With good planning, by integrating in existing expansion trends, and by targeting school expansions, fragmentations could be reduced and efficiencies realized without major restructuring taking place at one given period.

Salaries

Teacher Efficiency

Salaries and allowances for schools consume about 85 percent of total government expenditures for MOE schools. A large portion of these expenditures are for teachers. Three general strategies exist for reducing the numbers of teacher required in MOE schools: (1) increase classroom sizes, (2) increase school sizes, and (3) increase teacher workloads. Strategies 1 and 2 have been discussed above and represent a increase in the students per teacher. The third strategy is to increase the number of class periods that teachers teach.

There are 36 151 teachers counted in the 1991 EMIS data base. There are, in fact, 49 565 people who actually teach in the schools. The difference is in whether one counts assistant teachers and people who might be classified as technicians and managers. Whichever way "teaching staff" is defined, however, about the same spread of workloads is encountered. Table 16 shows the spread of workloads over the system.

TABLE 16
Class Periods Taught by Week in MOE Schools

No. of class periods taught per week	Percent of teaching staff represented
1-10	6.2%
11-15	3.9%
16-20	15.1%
21-25	51.1%
26-30	22.7%
30+	1.0%

Where are the teachers who have high and low workloads? What kinds of schools do they teach in?

Using the EMIS data base in combination with the NCERD Reform Evaluation data, this question was explored. First, teachers were grouped into five groups representing five approximately equally sized group based on workloads. Table 17 shows this:

TABLE 17
Workload Groups

Group	Mean class periods taught per week
1	18.7
2	20.7
3	22.0
4	23.4
5	26.9

Generally, years of teacher services and years of teacher education do not appear to vary with teacher workloads. Lowest and highest workload groups have nearly identical means on these factors and the spread for other groups is small.

It is more difficult to say whether workloads are associated with distant schools and schools with higher achievements. Table 18 shows a measure of school remoteness (distance to nearest secondary school) and a measure of achievement (total Arabic, Math and Science scores on an achievement test).

TABLE 18
Workload Groups by School Location and Achievement Scores

Group	Kilometers to Secondary Schools	Achievement Test Scores
1	3891	146
2	6447	142
3	2624	147
4	4078	148
5	3120	141

Sample sizes for the schools in the above table are small, and likely, population figures would vary somewhat. Nevertheless, no clear pattern presents itself as to a relationship between teacher workloads and either location of the school or achievement scores.

One factor does seem important in relation to workloads - that of school size. A fairly strong curvilinear relationship was found between workloads and school size. The teachers with the highest workloads are from the smallest schools. But small schools are also associated with low class loads. Table 19 shows these relationships.

TABLE 19
Workload Groups by School Size

Workload Group	Avg. school size (no. of students)
1	267
2	354
3	391
4	366
5	148

Clearly, smaller schools either assign relatively heavy workloads or relatively light workloads. The largest schools assign average workloads of about 22 class periods per week.

If workloads are not associated with achievement nor with structural factors such as location of the school (nor with size per se), likely workloads could be increased. All schools could be encouraged to assign workloads of at least 25 periods per week, for example. Schools with small workload averages should be examined and teachers assigned more class periods. Table 20 shows two scenarios for raising workloads. The first assumes workloads across schools could be raised an average of ten percent bringing the means load to 23 class periods per week. The second scenario assumes that the system-wide average would be raised to 25 class periods per week.

TABLE 20
Workload Increase Simulations

	Average class periods taught per week	Number of teachers needed	Percentage change
Current Case	21.06	36 151	0%
Scenario 1: Total system raise workloads 10 %	23.17	32 859	-9.1%
Scenario 2: Raise all workloads to average of 25	25.00	30 454	-15.8%

Clearly much can be saved by raising teacher workloads across MOE schools. Obviously, not all schools will be able to reach an optimal level of workloads as numbers of teachers do not always divide evenly into needed class periods. Nor are teachers infinitely interchangeable. Nevertheless, by looking at workloads on a school-by-school case, it is likely that some modest system-wide changes such as those proposed above could be realized with substantial savings.

Impact Analysis

Many of the efficiency possibilities identified here and discussed in this report can translate directly in a savings in the total MOE budget. As with much of the analysis upon which these efficiency gains are estimated, cost savings are also based on assumptions of how a system will respond and how various changes inter-relate. Thus, cost estimates, like efficiency gain estimates need to be interpreted as identifying parameters, direction and magnitude rather than absolute figures on dinars saved.

The follow represents estimates of the types of savings that might be realized if the fairly conservative efficiency gains were realized in the MOE system. These estimates are for long-term gains. Short-term gains would be smaller as changes take time to implement and work up to a critical point of implementation.

Administration

Administrative costs have gained as a percentage of total MOE expenditures over the last ten years. In 1982, administrative costs were 5.5 of total MOE expenditures. Today they represent 5.7 percent. In fact, as students enrollments go up, the percentage of total expenditure to administration should shrink as the cost of administration does not increase equally with student enrollments.

Table 21 shows estimates of cost saving based on partial and full realization of this goal.

TABLE 21
Cost Saving of Administration Efficiencies

	Percent of Success	Cost Savings	Percent of MOE Budget
Low Scenario: 60% success in reaching 5.5% goal	60%	57 480	.05%
Medium Scenario: 80% success in reaching 5.5% goal	80%	76 640	.08%
High Scenario: 100% success in reaching 5.5% goal	100%	98 800	.10%

Classrooms

Classroom sizes vary widely across the MOE system. Many small classrooms cannot be enlarged because the surrounding population is too small. Many medium sized classes, however, can be expanded and overall classrooms needed can be reduced.

Table 22 shows estimated cost savings were modest changes made in average classroom sizes. The table simulates the cost savings in varying percentages of schools that could increase their classroom sizes to 35 students.[7]

TABLE 22
Cost Saving of Classroom Size Efficiencies

	Percent of Schools increasing class size	Cost Savings	Percent of MOE Budget
Low Scenario: 10% of schools affected	10%	364 682	.35%
Medium Scenario: 20% of schools affected	20%	729 365	.71%
High Scenario: 40% of schools affected	40%	1 830 293	1.78%

7 The numbers are figures on a weighted change in the MOE Budget - the second related to "General Education." The reduction in a classroom will not calibrate into a reduction of the full costs of a typical classroom, however. Some costs will be retained (i.e. those directly related to student numbers). Also, not all students can be merged neatly into existing structures, so structural changes will occur. Thus, an 80% "efficiency" rate was used in average cost of classroom was translated into an 80 percent savings.

Fragmentation

Schools fragmentation represents a very large inefficiency within the system. Schools in close proximity which offer overlapping grades is the most obvious inefficiency and, perhaps, the easiest to rectify - simply choose which school will offer the single grade. Eliminating entire schools which are largely redundant or restructuring a given area which schools which serve grades 1-10 or 1-12 might be a long-term goal, and could be partially reached by careful planning of expansions.

Although the estimates provided in this report are very rough, the can serve to establish the parameters for the problem. Possibly, they might also serve as a measure of improvement should changes be systematically made. Even given the very rough estimates, it is possible to get some estimates of the magnitude of savings to be realized should reductions be made in fragmentation.
Table 23 shows cost savings based upon three scenarios for fragmentation:

TABLE 23
Cost Saving of Fragmentation Reduction Efficiencies

	Avg. school size	Cost Savings	Percent of MOE Budget
Low Scenario: If directorates with above average fragmentation reduced fragmentation by 20%	6.91	7 293 648	7.09%
Medium Scenario: If all directorates improved fragmentation by 10%	6.96	7 637 688	7.40%
High Scenario: If students per grade per school averaged a least 46 in all directorates	6.66	9 495 504	9.23%

Teacher Workloads

The variance in teacher workloads is not very large, but reducing this variation and raising loads to a modest standard would realize considerable savings to the system as a whole. Workloads do not appear to affect achievement within the relatively tight range of workloads of the current system (although, likely, they would if workloads are substantially smaller or larger). Neither are variations of workloads a structural necessity - small schools, for example, have widely variant workloads.

Table 24 shows the gains to be made if modest increases in overall workloads could be realized for the MOE system as a whole.

TABLE 24
Cost Saving of Establishing Higher Workloads for Schools with Low Workload Averages

	Percentage Increase in Average Workloads	Cost Savings	Percent of MOE Budget
Low Scenario: 5% increase in workloads - (avg. for total system)	5%	3 374 120	3.28%
Medium Scenario: 10% increase in workloads - (avg. for total system)	10%	6 748 240	6.56%
High Scenario: 15% increase in workloads - (avg. for total system)	15%	10 122 360	9.84%

Conclusions

Despite the inefficiencies discussed above, the MOE system is relative efficient in many areas where educational systems have problems. Student through-put is smooth so little money is spent on extra teacher time and facility usable educating someone for additional years Observation visits to some of the poorest and most remote schools indicated that most critical learning materials (such as textbooks and paper) were on hand and discussions with principals indicated that, generally, necessary supplies arrived on time and in adequate quantities. Classes are met, taught and learning appears to be taking place.

On a system level, the kinds of things required for efficiency are in place. Excellent records are kept at all levels - from the school up through the MOE headquarters. People who perform specialized tasks or manage specialized departments were able to give us good information and understood the parameters under which their work took place. Financially, expenditures are in line with the numbers of schools, teachers and students served.[8]
The four primary areas of inefficiencies discussed above involve, primarily, fine-tuning a system. The largest types of decisions are already in place and operational. Smoothing out disparities and identifying particular cases and areas of problems will result in cost savings.

[8] Several areas of efficiencies were investigated for this report but are not reported here because either the system appeared to be general efficient, or the quality of the data was doubtful and the apparent inefficiencies small. One such area were actual expenditure by directorate over a two and a half year period. Unfortunately, the data did not how the dispersion of salaries - by far the largest expediter. Nevertheless, for all other types of expenditures, a regression was run to see whether actual expenditures would equal predicted expenditures (based on student, teacher, manager and school numbers). The difference between actual and predicted expenditures was very small - variations centered around 10%. This would indicate that most expenditures are in line with the demand at the school level.

Table 25 summarizes these cost savings.

TABLE 25
Summary of Cost Savings Due to Efficiency Gains

	Low Scenarios		Medium Scenario		High Scenarios	
	Amount Saved	% of total MOE Budget	Amount Saved	% of total MOE Budget	Amount Saved	% of total MOE Budget
Administration	59 280	.05%	79 040	.08%	98 800	.10%
Classroom Size	364 682	.35%	729 365	.71%	1 830 293	1.78%
Fragmentation	7 293 648	7.09%	7 637 688	7.4%	9 495 504	9.23%
Teacher Workloads	3 374 120	3.28%	6 748 240	6.56%	10 122 360	9.84%
Totals	11 091 730	10.78%	15 194 333	14.77%	21 546 957	20.85%

Many of the changes cited above need to go through several steps before savings are realized. First, they must enter a policy dialogue between involved parties and a set of policy decisions must be made. Second, a closer look needs to be taken at each one. The estimates given here are useful to describing the magnitude and direction of the problem, but a program implementation requires detailed plans for specific cases - schools, teachers, etc. Third, a schedule needs to be proposed and money allocated (for any changes requiring an initial input of money). Finally, the changes can be made. These changes will impact over a period of time.

Thus, any changes discussed here are long-term in nature. They can and should be looked at more closely, but the cost savings impact over a period of years - not immediately. Also, efficiencies may actually turn out to mean not cost savings, per se, but reduced costs as the system expands. I.e. teachers not needed due to efficiency gains might well be needed as the system incorporates more students. Cost savings become reduced costs of expansion.

Technical Notes

1. The sample used for regressing test scores ("Student Efficiency" section). Involved 204 schools and 5200 5th graders. The model used here used only those students in MOE schools. Four thousand two hundred students from 169 MOE schools were included. The sample schools were a stratified random sample of the country. Each school had on section of 5th grade classes tested. Exams were administered in November 1992 by trained testing supervisors. Other variables in the analysis were obtained either from the MOE MIS data set for 1991/92 or from a questionnaire completed by the principal of each school in the sample.

2. The results of the regression on school repeaters was as follows: (See text for an explanation of the variables).

Results of Regression on Percent of Students Repeating			
	Beta	T	Sig
TOT_SCOR	-0.0004	-3.1540	0.0022
STUPRMNG	0.0000	-0.5120	0.6099
TAPEREC	0.0021	0.5300	0.5975
STUBENCH	-0.0027	-0.9390	0.3503
MULTIPUR	0.0011	0.3170	0.7523
OVERHEAD	-0.0001	-0.0350	0.9721
ELECTRIC	0.0044	0.5840	0.5606
ARB_T	0.0000	0.2640	0.7926
SHIFT	0.0029	0.5070	0.6137
TCHRCHAI	-0.0084	-1.6530	0.1020
AVGSEYR	0.0012	2.1990	0.0306
TYRSED	-0.0004	-0.1860	0.8532
VIDEO	-0.0019	-0.3140	0.7542
LOCATION	-0.0015	-0.3830	0.7029
SPEAKER	0.0010	0.2690	0.7886
TECHLABS	-0.0040	-0.8440	0.4009
PHONE	0.0004	0.1090	0.9137
LIB2	0.0137	1.2900	0.2007
TOTLIB	0.0000	-0.4200	0.6754
CLPRSTU	0.0049	1.0610	0.2915
ROOMLABS	-0.0004	-0.0860	0.9319
TCHRDESK	0.0080	1.6900	0.0946
TVSCHL	-0.0028	-0.4660	0.6427
STUPRTE	0.0004	1.1170	0.2670
TOTSTU	0.0000	-0.3780	0.7062
LIB1	0.0157	1.3730	0.1733
(Constant)	0.0342	0.9090	0.3661

COST RECOVERY IN MOE SCHOOLS:

Policy Perspectives

Education benefits both individuals and the larger society. It benefits individuals in so far as it prepares them for a life of higher productivity which translates into increased well-being and enjoyment of life. The society benefits in so far as the total productivity of the society is enhanced thus enabling a generally improved standard of living, increased political participation, commitment to national and social goals, and the pursuit of a just society. Theoretically, these two recipients of benefits - individuals and the larger society - ought to pay for the benefits they receive from education. Individuals ought to pay for benefits accrued to them exclusively and the larger society ought to fund the portion for which it derives benefits.

In the case of Jordan, as elsewhere, the theory does not translate easily into practice. Individual benefits will vary from person to person, but basing individual's contributions on their future benefits is speculative and a potentially expensive undertaking. Further, even if individuals will benefit enormously from their education, this benefit takes years to come to fruition and the costs accrued at the moment may be difficult to finance. Unlike other forms of personal investment (houses, cars, etc.) education is difficult to borrow for because there is no guarantee of a product (a productive individual able to pay back the loan).

A different approach is to gauge the benefits accrued the society and charge individuals for the residual benefits. Effectively, this is what Jordan has done in the past. Judging that education was a national priority, and desiring to create a man-made resource of human capital, Jordan fully funded all basic education, expanded education to reach nearly all individuals, and required, by law, participation. Essentially, education was fully funded by the government and individual benefits were treated as a residual - of little concern in so far as financing education.

Jordan has reaped the benefits of this approach. The man-made resource is largely responsible for the steady increase in the standard of living of the country. Value added goods and services represent 86 percent of the national economy. Education is nearly universal and the mean educational level is rising rapidly.

The approach of fully funded government education, while serving the country well in the past, is challenged by a dynamic world economy and a national economy that is increasingly influenced and structured by outside forces. The growth of a global economy has meant that the focus for economic growth has turned to global competitiveness. For Jordan, this means finding a place in a largely regional economic logic (even as the regional economy looks to the world for its logic). Development schemes which focused largely on accommodating internal needs must now take on an outward focus - how to participate at a competitive level in a regional/ global economy.

The need to be regionally or globally competitive means that Jordan must find a way to reduce government expenditures. While taxes generate the funds needed to provide social services, they also add to the cost of doing business in the country - whether the taxes be corporate, personal, income or sales. These increased costs translate into high prices for goods and services on the international market - and a reduced national competitiveness.

Reduction of government expenditures also assists competitiveness in another important way. When government expenditures are held to a minimum and less of the national production need go to national debt payments, more savings freed for use in the private sector (lower interest rates for private markets and thus reducing their costs). On the other hand, lowering government expenditures below their optimal level can work against economic and political stability and will jeopardize the safety net for poorer citizens as well as jeopardize the long-term human resource development. In an era where national economic health is largely tied to external forces, provision of government services will need to be carefully scrutinized - are such services rendered at their optimal level? As efficiently as possible? At a cost reflective of individual as well as societal benefits?

Globalization brings another fundamental change in the larger economic logic of the country. Individuals, properly trained and given the right type of experience and work environments, are now internationally competitive. Labor, once thought the province of a nation, is now

more mobile than before - especially for those who are most internationally competitive. Highly skilled individuals can now choose to either live in another country, live in Jordan but work for a foreign business, or live in Jordan and work in largely nationally defined enterprises. Individuals at this level derive enormous benefits from education. Many of these individuals are willing to pay for the education that benefits their future.

These concerns give rise to a third approach to setting prices of government services (education in this case). The approach gives primary emphasis to the benefits accrued the individual. This approach would charge individuals a fee for the benefits they receive. The government would continue to fund the portion of education that goes beyond individual benefits.

This approach, while seemingly consistent with the new global economic dynamic, has several problems. Primarily, for the vast majority of individuals, they cannot pay for the education they receive even if their benefits are enormous. They do not have the money today to fund benefits which will accrue them in twenty years.

A second problem is that the people who pay for today's education are not those that benefit tomorrow. Parents, the likely payee, must fund the education of all children. Although most parents will pay for benefits their children accrue, when funds are tight, parents will make decisions which, they perceive, are optimal for the family as a whole. Thus, when the child's labor is needed immediately, education will take a secondary role. Further, female children, who stand a decreased chance of providing future incomes, will tend to have a lower priority for education funds than their male siblings.

These considerations make for a complex picture of ability to pay. Even should individual benefits of education be high, the ability of parents to pay for a child's education varies widely. For wealthy parents, educational expenses are relatively modest. For the poor, living on a day-to-day basis, education expenditures represent a major expense and education may be foregone for more immediate concerns.

Instituting a policy of fee collections based on individual benefits or on ability to pay would represent a fundamental change in educational policy for the country. While the logic - especially given a rapidly changing global economic growth logic - seems solid, very careful consideration must be given to the larger societal implications. The imperfections of labor and education markets, as outlined above, imply that the normal logic of individual investment for individual benefits cannot be adopted carte blanche.

Flat Fee Increase Prospects

By far, the easiest means of having individuals pay for the benefits they accrue from government sponsored education is to raise the base level of fees (or "contributions") requested of each student. Table 1 shows the base contribution currently collected by the MOE and the total dinars generated in 1992:

TABLE 1
Student Contributions to MOE Schools

	Individual Contribution	Total Collected 1991/92
Grades 1-6	3.15 JD	1 352 157 JD
Grades 7-10	4.15 JD	994 667 JD
Grades 11-12	6.15 JD	544 227 JD

Source: Ilon and Al-Daje'h (1993) *Education and Training in Jordan*, NCERD.

The MOE does not strictly require that all students pay the fee. Officially, about 85 percent of all students do pay - hence it is termed a contribution. Collection is the responsibility of the principal of each school. Her job also includes assessment of individual cases where parents appeal for a waiver of the contribution.

The Study

In order to assess the ability to pay fees, a small study was conducted. The object was to predict school participation based on school fees controlling for several family factors known to affect school participation. As such, a questionnaire was devised that asked for information on entire families relative to the amount spent on schooling and the educational participation of each child.

For all schooling costs, actual expenditures varied widely. Essentially, parents who choose to send their children to private (and more expensive schools) are choosing to buy a "higher quality" product - whether the product is differentiated by quality, status or focus. Parental schooling decisions, however, are not based on the cost of private schooling. Rather, private schooling is a "luxury" option. Were private schools not available or were they to be priced beyond the means of the parents, it stands to reason that these same parents would choose to send their children to government schools. Table 2 shows values for fees and contributions.

TABLE 2

Comparison of Fees and Contributions

Grade	Mean for Poorest Group	Mean for Wealthiest Group	Mean for Sample	Typical Base Cost (Mode)
6	2.9 JD	39 JD	15 JD	4.15 JD
7	3.5 JD	132 JD	41 JD	4.15 JD
8	3.8 JD	133 JD	41 JD	4.15 JD
9	3.5 JD	153 JD	25 JD	4.15 JD
10	4.1 JD	184 JD	50 JD	4.15 JD
11	9.1 JD	208 JD	50 JD	6.15 JD
12	21 JD	287 JD	69 JD	20.00 JD

Source: Cost Recovery Questionnaire

Table 3 shows various values for the combined school costs.

TABLE 3

Comparison of Other School Costs

Grade	Mean for Poorest Group	Mean for Wealthiest Group	Mean for Sample	Typical Base Cost (Median)
6	44 JD	79 JD	60 JD	32 JD
7	49 JD	105 JD	98 JD	44 JD
8	46 JD	122 JD	74 JD	43 JD
9	57 JD	139 JD	93 JD	50 JD
10	71 JD	292 JD	143 JD	65 JD
11	69 JD	332 JD	202 JD	115 JD
12	67 JD	248 JD	193 JD	115 JD

Source: Cost Recovery Questionnaire

The fact that the mode is below the mean of the poorest 20 percent of the sample indicates that school costs are highly skewed toward the right (the vast majority are in the low end while the "tail" of high expenditures is extreme) and also that division of income groups is not a clear indicator of school expenditures.

The Findings

In addition to costs, the wealth of the family, the age of the child and the number of siblings all make a difference for whether the child stays in school to the age of 18. Although participation rates are lower for rural dwellers, the results indicate that the differences are not significant. Distance to the nearest secondary school also was not significantly important although it should be noted that only a minority of this age group would be attending secondary schools. Were this factor to be included for a sample which had fully reached secondary school age, the distance to secondary school may well have played a part in participation.

School costs are the only surprise finding. According to the results, school costs are positively related to school attendance. School costs are very flexible costs - parents can vary widely the amounts they choose to spend on extra texts, pocket money and even transportation (choosing different forms of transportation). Whereas it might be expected that, as school costs rise, more for schooling (or parents who are able to spend more), are rewarded with children who stay in school. Parental investment, then, would be positive.

The opposite, however, is true of the non-variable school fees. Assuming that the decision of whether to send a child to school is partially based on the school fees, parents are sensitive to fees in so far as child participation is concerned. Although fees are officially optional (contributions), it is still possible that parents feel pressured or committed to paying all or part of the "contribution" and might choose to withdraw children in marginal cases where costs might appear to be a factor.
In order to assess how school fee increases would affect school participation of groups based on family wealth (usevalue), sensitivity analysis was undertaken. Various fee levels were assessed for each income group. Table 4 shows these results. Since the sensitivity analysis changed only income group (usevalue) but allowed other variable to remain at the sample means, the sensitivities may well be an underestimate of changes in participation due to school fee changes.

TABLE 4
Simulated Changes in School Participation Under Various Fee Rates for Various Income Groups

	Income Group				
	1	2	3	4	5
Mean Usevalue	28.97	37.81	99.47	201.55	409.45
% of current fee	Projected Percent Participating in School				
0 %	+8.7%	+8.3%	+5.9%	+3.1%	+.6%
20 %	+8.5%	+8.2%	+5.9%	+3.1%	+.6%
40 %	+8.1%	+7.7%	+5.6%	+3.0%	+.6%
80 %	+4.3%	+4.2%	+3.1%	+1.8%	+.4%
100 %	0%	0%	0%	0%	0%
105 %	-1.6%	-1.5%	-1.1%	-.6%	-.2%
130 %	-14.0%	-13.6%	-11.0%	-7.2%	-2.4%
200 %	-62.2%	61.6%	-57.3%	-48.3%	-27.3%

The most striking result is that poorer groups are much more sensitive to price changes in school (demand is more elastic in economic terms). Changes in fees will affect the poorer groups first. A fee of 6.3 JD, for example, means less than a one percent change in school participation in the wealthier families, but will result in an estimated four percent change for the poorer families.

At current rates (7.65 JD - reflective of higher fees reported in grade 12), participation remains unchanged. A reduction in fees would increase participation - especially for poorer groups. Overall participation for the sample is 75 percent - approximately equal to participation rates observed in the total population. Participation rates vary widely, however, by income. Table 5 shows what participation rates for the five income groups would be like if fees were changed to various levels:

TABLE 5

Estimated Participation Rates Under Various Fee Rates for Various Income Groups

	Income Group				
	1	2	3	4	5
Current Rate of Partici-pation	67.39	64.30	75.64	70.65	95.15
% of Current Fee	Projected Percent Participating in School				
0 %	76.09%	72.60%	81.54%	73.75%	95.75%
20 %	75.89%	75.20%	81.54%	73.75%	95.75%
40 %	75.49%	72.00%	81.24%	73.65%	95.75%
80 %	71.69%	68.50%	78.74%	72.45%	95.55%
105 %	65.79%	62.80%	76.74%	70.05%	94.95%
130 %	53.39%	50.70%	64.64%	63.45%	92.75%
200 %	5.19%	2.70%	18.34%	22.35%	67.85%

It should be noted that the sensitivities rates cited above were observed under conditions whereby 15 percent of the participants essentially have fees waived. Were fees to be required, marginal changes would reflect larger losses in participation.. Also, the accuracy of these projections depends upon the "fit" of the model. Likely, other factors affect participation and estimates may be off slightly. Nevertheless, they serve the purpose of showing likely changes. Their magnitude relative to each other as well as the direction of change is likely to remain very stable over many samples and models.

Clearly, most families are very sensitive to fee cost increases. Current educational participation rates for children aged 12 -16 are approximately 75 percent (1990 estimates[9]). If fees were the only predictor of participation, even small fee changes would affect participation.

Table 6 demonstrates, if fees were changed (all other factors being held constant and at mean levels), different ages would be differentially affected as to participation rates. This indicates that, were fees to be raised, drop-outs would occur predominantly among older students, not just exclusively among the poor.

9 See Ilon & Al-Daje'h (1993) *Education and Training in Jordan*. NCERD.

TABLE 6

Participation Rates for Fees Changes by Age

% of current fee	Participation Rates				
Age-->	12	13	14	15	16
0 %	+2.4	+3.9	+6.1	+9.2	+13.2
20 %	+2.4	+3.8	+6.0	+9.0	+13.0
40 %	+2.3	+3.7	+5.8	+8.6	+12.2
80 %	+1.4	+2.2	+3.2	+4.5	+6.1
120 %	-2.8	-4.0	-5.5	-7.2	-9.0
140 %	-10.9	-15.0	-18.8	-23.1	-27.1
170 %	-20.2	-31.4	-37.5	-43.1	-47.5
200 %	-44.5	-51.7	-60.0	-62.6	nil

Once again, it must be realized that participation rates simulated here are based on MOE policy that 15 percent of all pupils are exempted from fully payment. Participation rates would be much lower if this were not the policy.

Evidence of School Completers

Further evidence as to ability to pay can be garnered from young adults who have completed schooling. Since the questionnaire was sent to families and all children in the family were listed, a sizable number of young adults were included in the sample. A total of 875 of the "children" were above the age of twenty.

Unfortunately, ex-post facto statistical models can not be used on this group as decisions concerning school continuation at largely marginal - cost and factors affecting the next school year. Since the questionnaire gathered only contemporary data, factors which affected schooling decisions at the time of school leaving are not available. Nevertheless, descriptive data of the characteristics of young adults categorized by the highest grade they achieved is instructive.

For each child who was no longer in school, a question was posed as to the highest grade achieved. Table 7 shows descriptives of these children.

TABLE 7

Demographic Data by Highest Grades Achieved: Age 20+

Highest Grade	% achieving this level or more	Use-value	% male	No. of sib-lings	Meters to nearest secon-dary school	% Urban	Father's Educa-tional level	Mother's Educa-tional level
2	98.4	117	50	9.36	5548	27	2.96	1.84
3	98.3	117	50	9.35	5543	27	2.96	1.84
4	97	118	51	9.35	5376	27	2.98	1.86
5	94.8	119	52	9.32	5222	28	3.02	1.88
6	91.7	119	53	9.32	5331	28	3.05	1.89
7	86.8	118	54	9.31	5252	29	3.07	1.92
8	83.1	120	53	9.35	5169	30	3.12	1.93
9	77.2	122	54	9.36	4844	32	3.17	1.97
10	63.6	127	52	9.33	4338	35	3.30	2.06
11	59.2	127	52	9.27	4388	34	3.33	2.07
12	54.1	130	52	9.31	4042	35	3.41	2.12
comm coll	17.2	148	53	9.5	1807	38	3.64	2.10
univ.	5.7	192	68	9.65	1864	41	4.16	2.44

Although descriptive data is not causal data, several types of trends are worthy of note. Children who reach higher levels of schooling come from wealthier families, are predominantly male, live closer to secondary schools, come increasingly from urban dwellings, and have more educated parents. Of particular note is the distance to secondary schools. Although this age group may well have attended a different secondary school than their younger siblings, distance clearly counts. Until recently, grade nine was the starting grade for secondary school, and, as children approach this grade, the distance they face to secondary school drops - those at longer distances are leaving school. This could be a function of rural versus urban participation, but it is an issue that needs to be investigated if secondary school participation is to be accessible to all.

Of more concern here, however, is the marginal cost of attending another year of schooling. Although older sibling no doubt faced different costs than their younger siblings, to the extent that these costs have changed in a linear manner (i.e. at some relatively consistently spread level of inflation), current costs are indicative of past costs. Marginal base costs were calculated much as typical base costs in the previous analysis. For each grade, average costs for students currently in school were calculated. A ceiling level was established at the mode fee level and median other school cost level. The two were combined at each grade level to arrive at a typical marginal base cost of attending an additional level of schooling. Results are reported in Table 8 .

TABLE 8

Typical Marginal Cost of Attending an Additional Year of School

Highest Grade Achieved	Next Grade	Marginal Cost
2	3	29.15 JD
3	4	31.15 JD
4	5	33.15 JD
5	6	35.15 JD
6	7	47.78 JD
7	8	51.46 JD
8	9	50.89 JD
9	10	62.65 JD
10	11	83.56 JD
11	12	78.60 JD
12	Comm College	116.41 JD
Comm Coll.	Comm College	116.41 JD
University	University	145.72 JD

Clearly costs rise as educational levels are pursued. Interestingly, even in the years where school fees are held constant (i.e. grade 1-6 and grade 7-9), costs generally rise each year. Also worthy of note, even when the marginal cost is estimated at base rates (i.e. lowest typical cost), fees represent only a small portion of total expenditures for schooling - roughly seven to ten percent. Also, the above costs reflect only out-of-pocket expenses and do not reflect the value of labor that is lost when a child goes to school. Thus, for the poorest families, where child labor may be an critical part of total family income, opportunity costs may well be as important as out-of-pocket costs in making decisions regarding continued participation in schooling.

For the vast majority of families in the country (about 80 percent), school fees are a major determinant of school participation. Given other intervening factors, such as the value of the child's labor, the difficulty of obtaining secondary school entrance, and the cost of taking the high school completion exam, prospects of marriage (particularly for girls) and the value of home labor, costs add an additional factor to be weighed in making decisions for continuation of schooling. For the most marginal cases - the poorest and the older child, fees may well be the factor that ultimately decides whether a child continues in school.

Results of this study indicate that across-the-board flat fee increases will result in loss of participation. A very modest increase may be possible, but only with the retention of a waiver allowance. Table 9 summarizes sensitivities to possible fee increases for the typical and marginal student.

TABLE 9

Summary of Participation Changes for Modest Fee Increases

	Population	Poorest Groups	Age 18
No fee change	75.0 %	65.8 %	20.0 %
Increase of 5 %	74.0 %	64.3 %	12.0 %
Increase of 30 %	65.0 %	52.1 %	6.0 %

It is difficult to argue for even the modest increase of five percent, as the poorest groups would actually increase their participation if fees were lower slightly. A 20 percent reduction, for example, would mean an increase of five percent in the participation of the poorest groups.

Given the relative sensitivities to fee changes for various income groups and various ages of children, a flat fee increase would mean that fewer children would attend school. Also, the population of schools would be increasingly weighted toward children of wealthier families. To be sure, this is already the case. Not all children attend school, and of those that do, a disproportionate number come from wealthier families. Fee changes do not create nor negate the problem, but only change the magnitude of these realities.

Assuming that the country is relatively happy with the current rate of participation and bias toward wealthier children, a flat fee increase is not a viable solution. Even small flat-fee changes would mean rather substantial changes in the current "mix" of school participants. A variable fee increase, however is worthy of consideration.

Variable Fee Prospects

Variability by Income Group

As discussed earlier, the optimal fee collection would involve collection of fees from individuals calibrated on his future benefit of education. Just as a person is expected to pay for other market goods and services from which she derives personal benefits, so schooling could, theoretically, be priced. The problems discussed in the introduction of inability to pay at the time schooling takes place and the imposition of family needs over those of individual benefits makes this an impractical solution.

The previous section examined the possibility of across-the-board fee increases. This type of fee increase is, by far, the easiest to administer and may be politically the most palatable - with a seeming element of equitability. In fact, though, flat fees for public services are not equitable as people have differing abilities to pay the fee. A poor person will spend a much higher percentage of his income on education than will a wealthy person who is confronted with a similar fee. Varying fees according to ability to pay (i.e. by income) is more strictly equitable although it would, no doubt, involve more administrative time and energy. This section explores the possibility of varying fees by income group.

Table 130 presents four scenarios for fee variability. For each scenario a different combination of fee levels are proposed. Using simulations, a percentage of students has been identified that can pay this fee level using the criteria that current attendance levels will be maintained (neither enhanced nor reduced).

TABLE 10
Scenarios for Variable Fees

Scenario	% of Current Fees	% in Group
1	0	15
	100	85
2	0	15
	100	15
	140	50
	200	20
3	0	20
	120	10
	140	70
4	0	20
	120	10
	140	23
	160	47

These scenarios will generate additional revenues as reflected in Table 11. Generally, there would be only a nominal cost to such variable fees. Assuming that principals, the teacher council or the school committee could fairly decide who would pay which costs (such decisions are school-based now), variable fee rates would have no process or implementation costs insofar as the MOE is concerned.

TABLE 11
Revenues Generated By Various Fee Change Scenarios

	Revenues Generated	Percent of MOE budget
Scenario 1	2 819 447	1.89%
Scenario 2	4 146 245	2.78%
Scenario 3	3 648 696	2.44%
Scenario 4	3 960 493	2.65%

The gain in revenues is slight - only .9 percent in the best case. Likely, not all these revenues would be collected as this assumes that whomever is collecting the fees is optimally efficient in evaluating and assessing the correct fee category for each student.

Several other types of variable fees might be possible. Although fee collection based on individual ability to pay has appeal in that is most precise in matching ability to pay with actual cost recovery, administratively it is difficult. School committee ability and willingness to accurately assess the level for each parent decreases with the number of categories.

Also, assessing fees at the highest category level may prove to be difficult for such committees as they are composed of contemporaries. The highest revenue generating scenario involves four categories - one of which has a fee increase of 200 percent (double). Likely many schools would have a difficult time assessing many parents with this amount.

Some of these issues can be made easier by assessing variable fees in a more categorical manner - where categories are decided by a (at least seemingly) more objective method. Three possibilities are explored below: variability by school, by level and by urban/rural.

Variability by School

Frequently, the children who attend a given school share similar home environment - poor, moderate and secure income levels, for example. One alternative to creating variable fee rates applied on a student-by-student basis is to assign schools a given category and to encourage principals to collect fees according to a given scale.

In order to explore this possibility, schools were grouped according to the mean usevalue of students in the school. A natural group of school occurred at three levels of income. Group 1 is the poorest group of schools and represent 22 percent of the students in the sample. Group 2 is the middle group of schools and includes 71 percent of schools. Group 3 represents the top seven percent of schools with the wealthiest families. Table 12 shows the distribution of each of these groups.

TABLE 12
Characteristics of School Groups

	% of students	% of schools	No. of schools in sample
Group 1	22.0 %	22.7 %	10
Group 2	71.2 %	65.9 %	29
Group 3	6.8 %	11.4 %	5

As expected, more schools fall into the middle group than either the highest group or the lowest group. Although at the school level of analysis, this data is not fully representative of the national population of schools, figures are probably indicative of large categories and trends. For this sample of schools, only 22 percent fall into the poorest category. Seventy-one percent fall in the middle range, and seven (6.8) percent of schools can be categorized in the highest range of fee paying potential.

Each of these school groups could be given different fee scales. In order to gauge where these fees ought to be established, sensitivity analysis was applies. Table 13 suggests a fee schedule of three fee levels. Just as schools are now encouraged to collect contributions at different levels (exceptions are given to the poorest schools, while schools in wealthier areas are expected to collect fees nearly universally). This plan would suggest that the three fees levels be applied differentially depending upon whether a school was thought to be in group 1, 2 or 3.

TABLE 13
Fee Collections by School Groupings

	Percent of Students falling in each fee level		
% of current fee	Group 1	Group 2	Group 3
0	50	10	5
140%	50	40	15
200%	0	50	80

Even this scale may need to be a bit flexible. Simulations indicate, for example. that approximately 2.3 percent of schools may have populations of students where fee scales, even in Group 1 are too much. Such schools would have to be evaluated on a case-by-case basis as they are now.

This fee scale would result in an estimated collection of 4 603 327 JD, or about 3.2 percent of the MOE budget (up from 1.8 percent). This is slightly more than any of the per-student variable scenarios and represents, perhaps, an administratively easier system to implement and maintain.

Variability by Level

Another option is to vary fees by level of schooling. Essentially, Jordan has identified the first 10 years of schooling as critical and has instituted policies designed to see that attendance in these grades is as close to universal as possible. Education beyond these levels is considered optional. These policies indicate that Jordan has identified universal education up through grade 10 as optimal, and secondary education as something it encourages but does not feel need be universal.

Fees for secondary education, then, could possibly be raised much higher than they are today. Table 14 shows the revenues that would be generated by raising secondary schools fees for various levels.

TABLE 14
Scenarios for Secondary School Fee Increases

Proposed Fee	Additional Revenue
6.150	0 JD
8.600	251 103 JD
10.500	445 836 JD
12.300	630 320 JD

It is not possible to project, accurately what changes in enrollment would occur as a result of these fee changes (given that the model applies only to children ages 12 - 16), but, since for younger children, age was shown to be a factor in schooling decisions, it is likely that for children in secondary school, fee changes would have an equivalent or greater affect on participation than for younger children.

As Table 17 reveals, however, the primary issue is that even fairly large increases would not generate much additional revenue - only an addition .4 percent of MOE expenses. Although secondary school fees might be increased modestly, this option can be viewed only in the context of marginal increases in additional revenues with the possibility of major effects on secondary school attendance. The issue of secondary school fees and attendance sensitivities should be studied separately, however, before any final conclusions can be reached as to possible fee increases.

Variability by Urban/Rural

Substantial differences exist between urban and rural dwellers. Many of these differences affect participation in education. Several of the factors found to affect participation in this limited study take on very different values for rural dwellers as opposed to urban dwellers. List below are some of the more interesting differences.

TABLE 15
Characteristics of Urban and Rural Dwellers

	Urban	Rural
Howfarse	1349	7377
Sibs	7.09	8.73
FED	4.8	3.1
MED	3.9	1.9
Useval	228.35	116.71
Inschl	.82	.72

For purposes of this study, the most interesting difference is the rate at which both groups participate in schooling (again, for ages 12-16). A difference of 10 percent exists. The differences observed in other characteristics translate into different sensitivities to fee changes as well. For this group, it is possible that applying two different fee rates might not only generate more funds, but may also serve as a means of promoting more equitable school participation.

Sensitivity analysis revealed different sensitivities to school fee changes, as expected. Using these results, a scenario was constructed that would maintain, overall, the same level of school participation while approaching equality of urban and rural dwellers. But charging differential fee rates, equity is enhanced while revenues are generated. Table 16 shows these results:

TABLE 16
Variable Fees for Urban and Rural Dwellers

	Urban	Rural	Weighted Total
	% of students paying		
No fee	10%	20%	17.3%
Present Fee	0%	80%	58.4%
160% increase in fee	90%	0%	24.3%
Current Enrollment Rate	82%	72%	75%
Projected Enrollment Rate	74%	78%	77%
Total Revenue Generated	3 486 826 JD	1 937 125 JD	5 423 951 JD

Participation rates shift dramatically for the two groups. Participation by urban and rural dwellers become more even as some urban dwellers face fees that are limiting - just as some rural dwellers to at present. Participation in urban areas falls to 74 percent - 90 percent of whom will pay fees 1.6 times higher than current fees. Rural dwellers increase participation was a higher proportion is allowed to attend with no fees. While it is never ideal to have any participation rates fall (urban or rural), today's participation rates can be maintained (or even slightly improved) while generating considerably more revenues. Also, equity is enhanced as both urban and rural dwellers face the same propensity to attend schools.

This scenario generates about 3.6 percent of MOE expenditures - about double what is now generated. This scenario also gives a slightly higher ceiling to rural schools for the percentage of students who can pay no (or reduced) fees and, equally, decreases this percentage for urban schools. Potentially, this is a fairly easy system to administer and, while not solving the problems of MOE budget in total, adds enough additional revenue to be considered as a possible policy change.

Conclusions

Impact by Fee Structures

Essentially, no reasonable amount of fee changes would get all children to school nor would it preclude participation of all children. Even were schooling to be free, four percent of this age group would not attend. Equally, the sensitivity to fee changes is such that only a small minority of families can afford to pay appreciably higher amounts for their children. Thus, the scope of policy changes for school fees is relatively limited for Jordan.

Few options exist if fees are to be raised across the board. Sensitivity to changes is such that all but the most modest of fee increases will mean that fewer children attend school. A modest increase of five to ten percent could be introduced with few consequences for participation. Anything above this amount would begin to affect participation rates unless a concomitant change is introduced as to the percentage of children that can be exempted. If Jordan is committed to a flat fee rate, a modest increase could be introduced although this increase would hardly contribute to MOE revenues.

From a purely economic perspective, a more logical option would be to introduce variable fee scales. Certainly, some families have more ability to pay than others. This is tacitly acknowledged in the current system by not requiring payment of fees (even calling them contributions), and by allowing some schools and families to pay lower portions of fees than others. This report explored four such possibilities: variability by income, school, level and location.

A system of variable fees could be designed so as to generate some additional revenues (albeit modest) and to make the opportunity for schools slightly more equitable. By raising fees for those who can generally pay, lowering expected fees for those who have less ability to pay, children of poorer families will have slightly increased chances of staying in school longer while the government passes on some of the costs to those most able to bear them.

Table 17 summarizes the options explored here for variable fee rates.

TABLE 17
Summary of Variable Fee Options Revenue Generation

Variability Applied to...	Additional Revenue Generated (JD)	Additional % of MOE Budget Funded	Total Revenue Generated (JD)	Total % of MOE Budget Funded
Current Fees	0	0%	2 819 446	1.89%
Income	1 329 920	.89%	4 149 367	2.78%
Schools	1 783 881	1.19%	4 603 327	3.08%
Level	630 320	.42%	3 449 767	2.31%
Location	2 604 504	1.71%	5 423 951	3.60%

The two options which generate much in the way of revenues are the two options which assess differential fees levels by school. In the case of the "school" option, schools are divided into three groups (one where fees collections are substantially reduced from present levels). The "location" options has two fee scales - urban and rural. The proposed fee scales for this option would approximately double the amount of funds that are generated by fees.

In either case, the additional amount to be collected is based on two critical assumptions - neither of which are likely to be fully valid. First, an assumption is made that the cost of collection is free to the system. That is, no additional administrative costs are incurred. Likely, at least some additional costs would be incurred, if only just to check that designated schools adhered to the variable rates. Also, as long as variable rates are legitimized, some time and effort will need to be spent dealing with schools who will argue for a change of their official category. Second, an assumption is made that fees are collected efficiently. That is, that parents who can pay the higher rates do pay these rates. In fact, there is likely to be some "leakage downward" where parents who could actually pay actually pay nothing or some reduced amount. This leakage is bound to be small, but it needs to be considered.

The primary factor to consider in raising fees, clearly, is that any fee rise will affect attendance unless it is very carefully crafted. As full participation in schooling is a goal of Jordan, weighing the social and political costs against the gains is an important policy decision. The final report in this series of financial reports will suggest other ways of increasing revenues to the MOE as well as estimate the extent of shortfall in the near future.

This study has explored the possibility of increasing fees with consideration of ability to pay. While fee levels ought, optimally, to be established along the lines of value derived for individuals, such a strategy is rarely possible in education. Value derived is established over a lifetime. Lifetime earnings are difficult to estimate.[10] Even if they were possible to predict, ability to pay is not linked to benefits. Those who pay are not those who benefit (parents vs. children) and market imperfections of labor mean that future earnings can not be borrowed against.

The alternative is to establish fees levels according to ability to pay (not exceeding individual benefits). Currently fee schedules and those proposed here are modest - far lower than the benefits individuals are likely to derive from their education. An optimal fee schedule under these conditions would simultaneously optimize revenue generation, be administratively simple and would not jeopardize existing rates of participation.

Within this scope, some options have been identified. Additional revenue generation is modest, but, combined with other types of revenue generation would contribute to the overall increase in MOE funds and the retention of school quality. The decision to implement one of these schemes rests on the larger issue of whether a policy decision away from state-funded education and toward funding through shared responsibility of individuals and government will be taken.

Impact on Instructional Materials

Another possibility is to allow schools to retain the additional fees and use them for purchasing instructional materials. Since very little in the general education budget is designated specifically for materials and supplies, most such items are purchased out of the revenues obtained through fees. Although a portion of the fees is returned to the regional offices, if all fee revenues were used by schools, and the above increases were made, considerable additional percentage increases would be available for the purchase of instructional materials.

Table 18 shows how such an increase would impact moneys available for materials and supplies. Moneys available for such items would increase by 65 percent.

Table 18
Impact of Increase Fees on Material and Supply Moneys

Source of Funds	Funds Available in JD
MOE Budget	248 000
Education Tax	5 000
Current Fees	2 819 446
Additional Fees	2 000 000
% increase over current expenditures	65%

10 Theoretically, one could attempt to derive them using a rate of return analysis. Unfortunately, predicting future earnings on the basis of currently earnings of those presently employed yields such spurious results, that the technique is more speculative than it is an appropriate guide for policy in this regard. Future earnings are linked to a dynamic economy and Jordan's economy is largely determined by outside forces. Future earnings are likely to diverge substantially from current earnings (even accounting for inflation).

Impact on Small Schools

Small schools are at a disadvantage when it comes to the purchase of additional materials, supplies and equipment when these funds are supplied through fees. Small schools frequently find that they cannot make purchases for necessary equipment in particular. The cost of a piece of equipment will sometimes be equivalent to the entire year's intake of fee moneys whereas the same equipment would cost only a small portion of intake from a larger schools.

Sensitivity analysis was performed on the basis of school size to ascertain what impact increased fees would have on each size-group of schools. Schools were grouped into nine categories on the basis of size.

TABLE 19
Average School Size by Classroom Size

Group	Mean No. of Students	No. of Schools	Percent of Schools
1	23	121	5.3
2	64	298	12.9
3	114	306	13.3
4	210	366	15.9
5	306	535	23.2
6	461	327	14.2
7	688	212	9.2
8	936	115	5.0
9	1132	22	1.0

Two possibilities for fee distribution were explored and contrasted: (1) distributions as they currently stand where schools retain fees paid by students, and (2) distributions whereby the suggested increase in fees were distributed on a per-school basis. This second distribution scheme employs a distribution combining per-student and per-school fee revenues. Existing fees would be retained on a per-student basis whereas increases in fees would be redistributed with each school receiving about 869 JD. Table 20 shows the impact of both distributions.

TABLE 20
Average School Size by Classroom Size

	Current Distribution			Distribution Favoring Small Schools		
Group	Additn'l Fees p/school school	Total per school	Percentage Increase	Additional Fees p/school	Total per school	Percentage Increase
1	127	312	69%	869	1054	469%
2	353	670	112%	869	1185	275%
3	630	1108	132%	869	1347	182%
4	1160	1948	147%	869	1657	110%
5	1690	2788	154%	869	1967	79%
6	2546	4145	159%	869	2468	54%
7	3800	6132	163%	869	3201	37%
8	5170	8303	165%	869	4002	28%
9	6252	10024	166%	869	4640	23%

Either distribution would, of course, raise moneys available for materials and supplies. Even the smallest schools would go from approximately 185 JD per school to 312 JD per school per annum under the current distribution scheme. If, however, fee increases were distributed on a per-school basis, smaller schools would receive about 1054 JD annually - a 469 percent increase. Their total revenues would still be considerably smaller than larger schools, as they should be. But they would be given enough funds to make major purchases that all schools need.

Appendix: Methodology and Analysis

Methodology

Questionnaires were sent to a stratified random sample of schools (including private and UNRWA). In each selected school, fifth graders were asked to take a short questionnaire home (one page, double sided) and have their parents fill it out[11]. Students were asked to return the completed questionnaire to their teacher who, in turn, returned it to the National Center for Educational Research and Development (NCERD).

The parental questionnaires were coded to match other research in progress. Thus, these questionnaires could be matched to principal questionnaires, teacher questionnaires, and, later, to student achievement, student questionnaires and a much fuller parental questionnaire. Thus, some variables were integrated from these other sources.

The completed questionnaires included 1046 families and information on 7265 of their children. The data were analyzed using the child as the level of analysis.

Of the 7265 children included in the survey, children aged 12 through 16 were studied for their participation in schooling (n=1570). As the distribution of questionnaires required that 5th graders take the questionnaire home with them, all fifth grade aged children in the sample attended school. Thus, for purposes of predicting participation in schooling, children beyond age 11 and not in the fifth grade were included.

While this choice of ages may seem rather arbitrary, in fact it is only at about age 12 that an appreciable number of children begin dropping out of school.

11 Although some attempt was made to make the sample nationally representative, the primary concern was to reach a representative sample of a wide range of families - poor, wealthy, urban, rural, northern, southern and central.

TABLE 21

Enrollment Ratios by Age

(Kindergarten, Basic & Secondary Only)

Age	Population Estimate	Student Enrollment	Enrollment Ratio
5	99 306	47 959	48.3%
6	99 220	92 401	93.1%
7	99 357	95 676	96.3%
8	99 617	96 989	97.4%
9	99 900	96 141	96.2%
10	100 236	94 459	94.2%
11	100 651	91 395	90.8%
12	100 407	87 705	87.4%
13	99 148	80 731	81.4%
14	97 158	73 763	75.9%
15	95 068	65 341	68.7%
16	92 742	57 562	62.1%
17	90 265	43 418	48.1%
18	87 740	17 564	20.0%

Source: Ilon & Al-Daje'h (1992) *Education and Training in Jordan*, NCERD

Even restricting this sample to older siblings of the fifth graders, some bias in the sample was expected and observed. An estimated six percent of fifth grade aged students are not in school in the country[12]. Thus, this six percent was lost to the sample. A weighting factor was used to correct for this bias, but it is still possible that the sample is not fully reflective of the types of students who drop out of school in the country.

Questionnaires were coded and entered by NCERD staff. Response rates were judged to be about 95 percent and questionnaires, generally, were received in usable form.

Of primary concern was finding a measure of income. Although income, per se, was not critical to the study, it is important to be able to measure sensitivity to fee increases based on relative income group.

The questionnaire asked respondents to give the monthly incomes of the two primary wage earners in the family. As expected, this information proved not to be useful. The majority of respondents did not complete this information. This was expected, in part, and several proxies had been fielded in the questionnaire. The proxy which proved the most useful was a series of questions which asked what durable goods and utilities existed in the household (car, tv, video, water, electricity, etc.). The usevalue of each of these goods was calculated on a monthly basis using, where appropriate, differential estimates based on urban/rural dwelling and father's education as a proxy for income.
From these individual values, a sum was derived referred to as "usevalue". This value was used as a predictor of school attendance as well as a means of dividing families into relative wealth groupings.

12 See Ilon and Al-Daje'h (1993) *Education and Training in Jordan: A Descriptive and Financial Survey*. NCERD.

Respondents were asked to list five school cost factors for each child in the household who is currently attending any type of school: fees or contributions, transportation costs, expenditures on school supplies, expenditures on books, and pocket money or any other miscellaneous money the student was given.

Since the purpose of this study was to judge participation based on educational expenditures, some manipulation was needed to adjust actual expenditures to a value that would reflect the typical base cost of an education at any given level in Jordan. Essentially, actual reported costs were transformed into typical base costs for all children.

All schooling costs were thus converted from actual expenditures to base costs - the cost at which schooling is typically available. For school fees (or contributions), the typical base cost was judged to be the mode contribution for each grade. This largely reflects MOE established contribution amounts. Once an estimate had been established of actual expenditures (including an estimate of what a child not in school would have spent - based on siblings and other children in his schooling reference group) any fees above the typical base cost were given a value equal to the typical base cost.

Other schooling costs were more difficult as the MOE does not establish limits and differences varied widely; the mode schooling expenditures had little meaning. For these costs (transportation, texts, supplies and pocket money), the first step was giving all children a total cost based on actual expenditures reported and, for those not in school, an estimated cost based on siblings and children in the school reference group of the same age. The typical base cost was judged to be the median of these combined costs. Once again, the range was restricted at the top to reflect a maximum typical base cost. Additional expenditures can fairly be judged to be discretionary on the parent's part.

Other variables were included that generally affect school attendance. These variables included an urban/rural measure, child's age, number of siblings, how far the nearest secondary school was from the grade 5 school, sex of child, mother's educational level, father's educational level, and the use value of goods and services in the household (a measure of wealth). Table 22 reviews basic information on these independent variables along with the dependent variable - whether the child is in school or not.

TABLE 22

Description of Other Variables in the Study

Variable Name	Description	Coding	Mean	Standard Deviation
Inschl	Dependent variable; measure of whether the child is in school	1= currently in school 0= currently not in school	.75	.43
Urban	Urban or rural dwelling	1= urban; 0= rural	.29	.46
Age	Age of child	age of child	13.91	1.38
Sibs	No. of children in the family	no. of children	8.25	2.72
Howfar se	How far basic school is from nearest secondary school	Distance in meters	5785	14885
Sex	Gender of child	1= male; 0= female	.53	.5
MED	Mother's education level	1=illiterate 2=literate, not schooled 3=grade 6 4=grade 9 5=grade 12 6=community college 7= university	2.49	1.76
FED	Father's education level	see MED	3.61	1.90
Useval	Monthly use value of goods and services in the household	See discussion (in JD)	149.63	146.93

Source: Cost Recovery Questionnaire

A probit maximum likelihood model was used given the dichotomous dependent variable. As the probit estimates a z-value of the dependent variable, z values were converted to probabilities using a normal curve conversion. Once the model had been run and parameter estimates were obtained, simulations were conducted in the following manner. First, mean values for all variables were used as estimates of the "x" value - resulting in a typical case probability of attending school. Second, the mean use values for each income group were substituted for the overall mean usevalue in order to simulate predictions for the five income groups. For each income group, simulations were made for changes in school fees by substituting specific fee values for the mean value.

Analysis

As expected, the probability of attending school was highly affected by the fee (contribution) level. Although five variables proved to be significant at the .05 level, fees had a coefficient/standard error level of 12.65 (roughly equivalent to a t-value) - a significance level far in excess of the criteria value of .05. Table 23 shows probit coefficients.

TABLE 23
Probit Results

	Coefficient	Coefficient/ Standard Error
Urban	-0.0469	-.54914
Age	-3.03043	-2.70353
Sibs	-0.77781	-2.30863
Howfarse	0.00001	1.09202
Schoolcost	0.223916	2.39939
Sex	0.040662	-.36142
MED	-0.13237	-.60558
FED	0.065883	.24457
Useval	0.445897	2.68772
Fees	-1.98357	-12.65688
Intercept	6.91152	5.34783

Source: Cost Recovery Questionnaire

LONG-TERM RECURRENT COSTS OF THE EDUCATION REFORM

Overview

In 1989, Jordan instituted implementation of an educational reform. The implementation of the reform was to cover a ten year period beginning in 1989 and ending in 1998. It is estimated that the gulf crises set back full implementation about two years. The reform was to cover seven major areas:

- Basic and Secondary School Curriculum Development
- Textbook Development
- Teacher and Supervisory Staff Training
- Educational Technology Additions to Schools
- Educational Facility Improvement
- Vocational Training Expansion
- Educational Research and Development Capacity Building

Methodology

This monograph estimates the cost of the reform only. Generally, increasing student enrollments and concomitant changes in teacher and school numbers will also mean increases in costs. In order to account for all costs, the following strategy was used:

1. The long-term costs of the reform are estimated in isolation of other changes. Thus, the body of this report shows the impact of the reform ***were no other changes intervening.***

2. An estimate is made of total long-term increased costs ***due to the reform.*** This information is summarized in the final table in this report.

3. From this estimate ***a percentage increase is derived.*** This information is combined with estimates of the costs of other changes and incorporated in the final report of this series.[13]

It is also important to note that this monograph derives long-term costs only. No attempt has been made here to estimate implementation (capital) costs. This monograph is intended to provide an estimate of the costs associated with maintaining the changes put in place by the reform. The timeline for the reform has slipped slightly, but the time frame for which this monograph is written in still rather clear - the costs estimated here apply to recurrent costs - those occurring after changes are in place. The concern here is to give some general notion of the long-term increased costs associated with the reform. This will form the basis for estimating total system costs once all changes are in place.

Calculations were based on known costs as of June 1993. These costs were projected to final costs by weighting them for percentage completion of the task. These costs varied, in some cases substantially, from original costs estimated in the World Bank's original report. [14]

It is assumed that the reform has no long-term effect on capital costs - i.e. those remain the same per student (allowing for inflation) as they were pre-reform. Reform changes are fully incorporated within recurrent costs of education.

All costs are stated in terms of 1992 dinars.

13 See Ilon, Lynn (1993) *Educational Finance in Jordan: Final Report.* Amman: National Center for Educational Research and Development.

14 Staff Appraisal Report: The Hashemite Kingdom of Jordan: Human Resources Development Sector Investment Loan (World Bank: May 1989).

Cost of Changes

Essentially, the cost of the reform will accrue to four parties: The Ministry of Education, the public universities, the Vocational Technical Corporation (VTC) and The Royal Scientific Society (for establishment of the National Center for Educational Research and Development). Private expenditures will also be incurred as tuition is paid for additional participation in MOE schools, VTC centers, and at the universities (for teacher training).

Cost to the Ministry of Education

Teacher and Supervisory Staff Training

Two types of training were to be undertaken for teachers and supervisors.

- ***Certification of basic education teachers.*** This was to involve raising all basic teachers to the level of B.A./B.Sc..
- ***Upgrading Secondary Teachers and Supervisors.*** All secondary school teachers and supervisors were to have B.A. or B.Sc. and "pedagogical qualifications based on course work of at least one academic year."[15]

Certification of Basic Education Teachers

Although the original plan of the reform was to have all basic education teachers to be upgraded to a B.Sc. degree, the rate of completion at the time of this estimation indicated that this goal would not be accomplished by the end of the reform. For purposes of this report, it was estimated that the goal of complete upgrading would be half met by the end of the reform.

TABLE 1
Changes Due to Basic Teacher Certification

	Change by End of Reform
% of teachers with at least B.Sc.	+34%
Change in avg. annual salary	JD 153
Total Annual Costs Ph I & II	5 119 692

In 1988, only 32 percent of Basic teachers had qualifications of at least a B.Sc. degree. By the end of the reform, an expected 66 percent will have such a qualification. Since teachers who are more qualified command a higher salary, annual costs of maintaining the teaching staff will increase even if total staff size were to remain the same. One average, a per teacher cost of JD 153 is expected as a result of new certification levels. Total annual MOE costs of maintaining this staff would be just over five million JD.

15 World Bank (May 1989) "Staff Appraisal Report, The Hashemite Kingdom of Jordan: Human Resources Development Sector Investment Loan". (Pg. 21)

Upgrading Secondary Teachers and Supervisors

The upgrading of secondary teachers and supervisors was also to be completed by the end of the reform. Once again, current trends would indicate that this goal will not be reached. The following is estimated assuming that half of the anticipated upgrading would have been done by the end of the reform. Table 2 shows the impact of anticipated changes.

TABLE 2
Changes Due to Secondary Teacher and Supervisor Upgrading

	Change by End of Reform
% of teachers with at least B.Sc.	+25%
Change in avg. annual salary	498 JD
Total Annual Costs Ph I & II	3 040 884

The above figures were derived by estimating changes in secondary teachers and in secondary supervisors separately and then combining them (using weights). Sixteen percent of secondary teachers and supervisors had at least a B.Sc. plus diploma (or equivalent) in 1988. By the end of the reform it is estimated that fully a quarter will have such qualifications.

The average annual increase in wages due to this upgrading is 498 JD. Teachers will see a 475 JD increase while supervisors will see an average increase of 531 JD. Total costs are estimated at 3 040 884 JD annually - 56 percent of which is due to the teacher upgrading and 44 percent due to supervisor upgrading.

Curriculum Changes

Three long-term structural changes will occur as a result of curriculum changes. New textbooks are being distributed. A new warehouse for textbooks is anticipated. Finally, the Curriculum Department has added 50 additional staff. Table 3 summarizes the costs of these changes.

TABLE 3
Costs Due to Curriculum and Textbook Changes

	Costs in 1992 JDs
Additional Staff	120 000
New Textbooks	242 943
Warehouse maintenance	10 848
Total Annual Cost Phases I & II	**373 791**

Textbook development, per se, is an implementation cost and not a long-term recurrent cost. Nevertheless, the new texts being developed appear to be slightly more expensive than the textbooks which were used before the reform. Once new texts are fully in place, it will cost 242 943 additional JD annually to replace them. On aggregate, they are seven percent higher in cost than the former textbooks.

Warehouse maintenance costs will be new - an estimated 10 846 JD annually. New curriculum staff currently cost the MOE about 120 000 JD per annum.

Educational Technology

Two types of facility improvements were to be made under the reform. The primary change was to add a substantial number of student places by building new schools or adding facilities to existing schools. This is discussed below in the "Educational Facility Improvement" section. The second change was to add specific facilities and equipment termed "educational technology." Specifically, this involved adding science labs, storage rooms or multi-media equipment and libraries and workshops. Long-term recurrent costs involve the maintenance and replacement of these facilities and equipment.

At the time of this report, a total of 118 schools were to receive educational technology upgrades in Phase I. An estimated 331 250 JD will be needed annual to maintain these facilities. Maintenance of new furniture - spread over ten years - is about nine million JD annually.

TABLE 4
Educational Technology Maintenance Costs

	Costs in 1992 JDs
Facilities	331 250
Furniture and Equipment	882 900
Total Phase I	**1 214 150**
Total Phases I & II	**2 428 300**

Educational Facility Improvement

A total of 152 schools were to be upgraded in Phase I of the reform (based on data at the time of this writing). The average annual maintenance cost was calculated to be 11 280 JD per school. Furniture and equipment maintenance costs varied by whether the school was getting new or replacement equipment and furniture. Replacements imply that some maintenance costs are already built into the budget and need to be increased. The average is about 2 200 per school. New equipment and furniture was calculated at an average annual maintenance cost of 11 000 JD. Table 5 shows anticipated costs of these facility improvements.

TABLE 5
Educational Facilities Maintenance Costs

	Costs in 1992 JDs
Facilities	1 714 558
Furniture and Equipment	1 073 600
Total Phase I	**2 788 158**
Total Phases I & II	**5 576 316**

The most fundamental change caused by the reform is the inclusion of Grade 10 into the Basic cycle. Ten grades are now required for school completion. This represents a long-term recurrent cost to the system.

Even in 1988, many students attended Grade 10 (pre-reform). Thus, not all Grade 10 students today can be said to be attending school because of the reform. Between 1988 and 1989, student enrollments for Grade 10 were 22 percent higher than expected growth would have accounted for. This represents a 1.45 percent increase in total enrollments for the MOE..

This increase, however, estimates only the increase in numbers of students. Grade 10 students are more expensive to educate than are Grade 1 students, for example. Further, such costs as administrative costs do not rise exactly in line with rises in enrollments. The marginal cost to the system of the additional grade 10 students was calculated to be a 1.47 percent increase. This translates into an annual additional cost of 1 493 520 JD. Since the increase is a one-time only cost, no additional costs will be accrued in Phase II over and above those that occurred in Phase I.

Cost to Public Universities

Two types of additional expenses will accrue the public universities. First, new facilities are being constructed and equipped for teacher training. These will require maintenance and replacement. Second, additional students will be admitted.

Approximately 12.6 percent of the university construction was completed at this writing. Once fully completed, annual maintenance costs on new university construction will be approximately 143 183 JD annually. Maintaining new equipment and furniture will cost 502 942 annually.

To date, approximately 1500 teachers are receiving additional education as a result of the reform. They pay their own tuition, but the actual costs of their education exceeds their tuition costs. Some of these costs are already absorbed, of course. The universities have been training teachers for some time. The added costs come not only from additional students, but from the increased length of time of study of students - given increased certification requirements. Costs are estimated to run about 6.5 million JD annually.

Since no additional construction is contemplated in Phase II, all costs are absorbed in Phase I. Also, since student costs are expected to remain relatively stable from Phase I to Phase II, no additional annual student costs are accrued in Phase II. Table 6 summarizes the total additional public university costs that will be incurred.

TABLE 6
Annual University Additional Costs

Cost Type	Annual Cost
Maintenance of New Buildings	143 183 JD
Additional Students	6 474 738 JD
Equipment Repair & Replacement	502 942 JD
Total Phases I & II	**7 120 863 JD**

Cost to Vocational Technical Corporation

The Vocational Technical Corporation will have opened three new centers and expanded a fourth by the end of the reform. Three types of long-term recurrent costs will be incurred: maintenance of new centers, cost of additional students, and replacement/repair of equipment put in place.

Table 7 shows the breakdown of estimated additional annual costs.

TABLE 7
Annual VTC Additional Costs

Cost Type	Annual Cost
Maintenance of New Buildings	60 776
Additional Students	987 027
Equipment Repair & Replacement	225 461
Total Annual Phase I & II	**1 273 264**

The construction costs amount to just over 3 million JD and cost an annual estimated 60 776 JD to maintain. Maintaining the furniture and equipment - amortized over a much shorter period - costs 225 461 JD.

VTC programs have a mix of full, part-time and temporary students. Each has a different cost. Each pays a small percentage of the cost in fees. The average sized center with the average mix of students, costs about 246 766 JD annually in student costs. The annual additional costs of educating an estimated increased number of students is just under one million dinars per year.

Establishment of the National Center for Educational Research and Development

In 1990, the National Center for Educational Research and Development (NCERD) was established in accordance with the dictates of the reform. Although the NCERD is very involved in aspects of the reform (i.e. in its evaluation), the intention is for the Center to remain in the long run. Since the NCERD is so new, it is difficult to estimate what it will look like in the long run. The most logical guess is that it will look much as it looks today. Although the reform work will be completed, the NCERD's work continues to expand in other areas. Thus, the contraction caused by the completion of the reform evaluation will be compensated by a rise in demand in other educational research areas. The annual cost to the HKJ government is 187 404 JD.

Summary

By Accruing Authority

The major bulk of the costs of the reform are to be borne by the Ministry of Education. Long-term recurrent costs to the MOE will amount to about 17.3 million JD annually. This represents about 67 percent of the total costs of the reform (exclusive of private costs accruing to students and their families). The universities will accrue 27 percent of the total costs over the period. All universities increased expenditures begin in Phase I of the reform. Total public university costs are approximately 7.1 million JD. Finally, the VTC accrues 1.3 million JD in continuing expenses. This represents only about five percent of the total costs. Table 8 summarizes these figures. The NCERD represents less than one percent of total cost.

Table 8
Reform Costs by Authority

	Total Costs	% of total long-term reform costs
MOE	17 285 741	67
NCERD	187 404	1
Universities	7 120 863	27
VTC	1 273 264	5

Cost already absorbed

Not all long-term costs have been absorbed to date. Indeed, some have not been accrued as yet. Even in phase one, some implementation costs have not been completed meaning that long-term costs have not yet begun to come on-line. A building has to be completed, for example, before maintenance costs begin to be a factor. A building has to be complete before it can be furnished and the cost of repairing and replacing equipment and furniture begins to accrue.

Thus, for each item, a percent completed numbers has been estimated. This number assists in estimating long-term impact by giving an estimate of costs already absorb and costs yet to be absorbed.

Since this report is occurs during (and not prior) the implementation of the reform, some costs will already have been absorbed into the usual operating costs. Thus, for each item, "costs already absorbed" has been calculated on the basis of completion rates.

Table 9 shows costs absorbed and yet to be absorbed for the three authorities affected.

Table 9
Reform Costs Absorbed and Not Absorbed

	Absorbed	Yet to be Absorbed	Percent Absorbed
MOE	4 838 282	12 447 459	28.0%
NCERD	187 404	0	100.0%
Universities	6 492 779	628 084	91.2%
VTC	71 148	1 202 116	5.6%

Overall MOE costs are already 28 percent absorbed. Primarily this derived from the fact that many staff have already been upgraded and a number of facilities improvements are on line. The universities have already absorbed the bulk of their additional costs in the form of increased student enrollments. The costs of maintaining new buildings, furniture and equipment has yet to be borne. The VTC (at the time of this report) had none of their facilities ready for occupation and has not incorporated these costs.

Phases I and II

The ten year reform has been divided into two phases: Phase I and Phase II. Phase I involves several start-up costs not included in Phase II. Some of the facility upgrading and training processes are on-going. On-going building implies cumulative maintenance costs - they increase every time a new facility is opened. Other types of on-going costs are stable - training for example involves a continuous (not increasingly) stream of costs.

Tables 10 and 11 show costs of the reform in various ways. First, costs are divided between Phase I and Phase II. Second, costs absorbed and not absorbed are shown. Costs are also broken-down by authority and subprojects.

The costs most critical to planning are shown in the right-hand most column. These represent long-term annual recurrent costs which have yet to be borne. These are direct additional budgetary cost due *strictly to the reform*.[16]

16 They are combined with other system changes in the "Final Report" of this series.

Table 10
Estimates of Long-Term Annual Recurrent Costs of the Reform

	Cumulative Annual Phase I + Phase II	Phase I Total Costs	% Com-plete	Costs Already Absorbed	Costs to to be absorbed Phase I	Additional Estimated Phase II Costs	Long-term costs not absorbed
Staff Upgrading							
Basic Teachers	5 119 692	2 559 846	31%	793 552	1 766 294	2 559 846	4 326 140
Secondary Teacher & Supervisors	3 040 884	1 520 442	55%	836 243	684 199	1 520 442	2 204 641
Subtotal	***8 160 576***	***4 080 288***		***1 629 795***	***2 450 493***	***4 080 288***	***6 530 781***
Curriculum Changes							
Additional Staff	120 000	120 000	100%	120 000	0	0	0
New Textbooks	242 943	242 943	48%	116 613	126 330	0	126 330
Warehouse maintenance	10 846	10 846	0%	0	10 846	0	10 846
Subtotal	***373 789***	***373 789***		***236 613***	***137 176***	***0***	***137 176***
Educational Facilities Main. & Repairs							
New construction	3 429 116	1 714 558	65%	1 114 463	600 095	1 714 558	2 314 653
New furniture and equipment	2 147 200	1 073 600	65%	697 840	375 760	1 073 600	1 449 360
Subtotal	***5 576 316***	***2 788 158***		***1 812 303***	***975 855***	***2 788 158***	***3 764 013***
Educational Technology Main. & Repairs							
New construction	662 500	331 250	34%	112 625	218 625	331 250	549 875
New furniture and equipment	1 765 800	882 900	34%	300 186	582 714	882 900	1 465 614
Subtotal	***2 428 300***	***1 214 150***		***412 811***	***801 339***	***1 214 150***	***2 015 489***
Additional Grade 10 students	***1 493 520***	***1 493 520***	***100%***	***1 493 520***	***0***	***0***	***0***
Total MOE Annual Costs	**17 285 741**	**9 203 145**		**4 838 282**	**4 364 863**	**8 082 596**	**12 447 459**

Table 11
Estimates of Long-Term Annual Recurrent Costs of the Reform

	Cumulative Annual Phase I + Phase II	Phase I Total Costs	% Com-plete	Costs Already Absorbed	Costs to to be absorbed Phase I	Additional Estimated Phase II Costs	Long-term costs not absorbed
Total MOE Annual Costs	**17 285 741**	**9 203 145**		**4 838 282**	**4 364 863**	**8 082 596**	**12 447 459**
Public Universities							
Maintenance of New Buildings	143 183	143 183	13%	18 041	125 142	0	125 142
Additional Students	6 474 738	6 474 738	100%	6 474 738	0	0	0
Equipment Repair & Replacement	502 942	502 942	0%	0	502 942	0	502 942
Subtotal	***7 120 863***	***7 120 863***		***6 492 779***	***628 084***	***0***	***628 084***
Vocational Technical Corporation							
Maintenance of New Buildings	60 776	60 776	23%	14 161	46 615	0	46 615
Additional Students	987 027	987 027	5%	46 390	940 637	0	940 637
Equipment Repair and Replacement	225 461	225 461	5%	10 597	214 864	0	214 864
Subtotal	***1 273 264***	***1 273 264***		***71 148***	***1 202 116***	***0***	***1 202 116***
Nat'l Cntr. for Educational Res. and Dev't	***187 404***	***187 404***	***100%***	***187 404***	***0***	***0***	***0***
TOTAL LONG-TERM ANNUAL COST OF REFORM	**25 867 272**	**17 784 676**		**11 589 613**	**6 195 063**	**8 082 596**	**14 277 659**