**The Hashemite Kingdom of Jordan**

**National Center for Human Resources Development**
(NCHRD)

**Supervision Committee for Evaluation Studies for Education Reform for Knowledge Economy Project (ERfKE I)**

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# Baseline Follow up Data Report

**Education Reform for the Knowledge Economy (ERfKE I)**

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**General Background Indicators Related to Education**

The current population of Jordan is approximately 5.5 million, with nearly 80 percent living in the four urban areas of Amman (40 percent), Irbid (18 percent), Zarka (15 percent) and Balqa (7 percent). The population is young. It is estimated that 38 percent of the population is less than 15 years of age. The population growth rate appears to be coming down but is still high at 2.78 percent. By 2012, the school-age population is predicted to increase from 1.5 million to nearly 2.0 million, a one-third increase in less than 8 years.

The literacy rate in Jordan is one of the highest in the Arab world. Some 91 percent of the population over age 15 is able to read and write. This is a solid achievement that bears witness to the high priority placed on the education sector over the past twenty years.

The 10-year Basic cycle is compulsory for all 6-16 year olds and provided free in public schools. The two years of secondary education are not compulsory but they are free for all students who wish to continue beyond the Basic cycle.

Jordan spends 6.4% of GDP and 13.5% of total government expenditures on Education, higher than the average for countries with similar population sizes and income levels. The budget of the Ministry of Education, as percentage of the government of Jordan's General Budget, has been raised from 7 percent in 1960 to 8.75 percent in 1990 to 11 percent in 1998 and to 13.5 percent (of total expenditures) in 2003[1]. Enrollment rates at each level of education are consistent with other countries at similar income levels, but population growth and socioeconomic pressures are placing high demands for further expansion and improvement of infrastructure, programs and services. Jordan is well on its way to achieving the Millennium Development Goals in terms of primary completion rates and the elimination of gender disparities in education (MDG report, 2007). In 2004, UNESCO ranked Jordan 18$^{th}$ out of 94 countries in the "Education for All" rating for gender and education, indicating that Jordan provides equal learning opportunities for males and females. The quantitative growth rate of the educational system since 1960 has been remarkable. The number of Ministry of Education (MOE) schools increased from 714 in 1960 to 3,053 in 2003. The number of students in MOE schools increased during the same time period from 128,743 to 1,088,839. The 2001 gross enrollment rate (GER) for grades 1 to 10 was 94 percent and the net enrollment rate (NER) was 86.3 percent. Most students in the Basic cycle are enrolled in schools run by the MOE (73.5 percent), followed by the private sector (14.5 percent), UNRWA (11.2 percent) and other ministries (0.8 percent). Tables below show the most recent data.

Most secondary school students are enrolled in MOE schools (84.5 percent), with the remaining enrollments distributed across schools provided by other government ministries (5.5 percent), the private sector (8.7 percent) and UNRWA (0.3 percent). In 2001, the GER was 75.6 percent and the NER was 64.6 percent. Girls represent 50 percent of the enrollments in secondary schooling.

[1] Source: MOE Statistical Report 2003 and 2003 brochure

**Prior Reform Efforts**

The first attempt at major educational reform began in 1973, when the Education Development Plan was constructed and adopted by the Government of Jordan. In retrospect, the resulting reforms were modest and had limited impact. Problems confronting the education system continued until the mid-1980s. After a critical review and assessment was undertaken between 1985 and 1987, a major Education Reform Program (ERP) was initiated under the Human Resources Development Sector Investment Loan Projects (HRDSIL I and HRDSIL II) with World Bank assistance. The reform programs included activities in curriculum development, textbook development, teacher and supervisory staff training, educational technology development, facility improvement and technical vocational education and training development. The overarching goal of the ERP was to enhance student achievement by (1) restructuring the school system and improving the quality of teaching and learning; (2) developing an institutional structure responsive to the system's long-term qualitative and quantitative needs; and (3) developing the system's capacity to evaluate the ERP and sustain it on a self-renewing basis.

**Enrollment figures**

Enrollment and drop-out rates are used to monitor success in the education system. To a degree enrollment was affected positively by ERfKE interventions while repetition and dropouts increased slightly.

| **Enrollment ratios** | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **KG** | | **Basic** | | **Secondary** | |
| | | **03** | **07** | **03** | **07** | **03** | **07** |
| | **All** | 36.0% | *35.4%* | 93.8% | *94.6%* | 67.4% | *75.0%* |
| **Gross** | **Male** | 37.0% | *36.5%* | 92.1% | *92.9%* | 64.8% | *71.8%* |
| | **Female** | 34.9% | *34.3%* | 95.7% | *96.5%* | 70.3% | *77.9%* |
| | **All** | 50.7% | *74.6%* | 91.0% | *91.8%* | 53.7% | *59.5%* |
| **Net** | **Male** | 34.0% | *33.5%* | 87.5% | *88.2%* | 57.9% | *64.2%* |
| | **Female** | 32.1% | *32.0%* | 91.5% | *92.3%* | 61.0% | *67.6%* |
| Source: MOE, 2003, 2007 (to be re-checked and confirmed with MoE) | | | | | | | |

The drop-out and repetition data at MOE schools by grade is:

| | | **Repetition** | | | | | | **Drop-Out** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **All** | | **Male** | | **Female** | | **All** | | **Male** | | **Female** | |
| | | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| **Overall** | | 0.61 | 1.04 | 0.70 | 1.20 | 0.52 | 0.89 | 0.42 | 0.64 | 0.49 | 0.72 | 0.35 | 0.56 |
| **Basic Cycle** | | 0.63 | 1.13 | 0.70 | 1.31 | 0.57 | 0.97 | 0.39 | 0.66 | 0.47 | 0.77 | 0.32 | 0.56 |
| **Grade** | **1** | 0.35 | 0.30 | 0.35 | 0.39 | 0.36 | 0.21 | 0.15 | 0.32 | 0.16 | 0.32 | 0.14 | 0.31 |
| | **2** | 0.19 | 0.15 | 0.19 | 0.16 | 0.18 | 0.14 | 0.1 | 0.24 | 0.13 | 0.26 | 0.08 | 0.23 |
| | **3** | 0.17 | 0.14 | 0.18 | 0.14 | 0.17 | 0.14 | 0.08 | 0.19 | 0.09 | 0.20 | 0.06 | 0.18 |
| | **4** | 0.47 | 0.75 | 0.47 | 0.74 | 0.47 | 0.77 | 0.18 | 0.33 | 0.21 | 0.39 | 0.14 | 0.26 |
| | **5** | 0.72 | 1.02 | 0.82 | 0.98 | 0.63 | 1.05 | 0.23 | 0.37 | 0.31 | 0.51 | 0.15 | 0.25 |
| | **6** | 0.86 | 1.15 | 0.97 | 1.20 | 0.75 | 1.10 | 0.32 | 0.53 | 0.43 | 0.71 | 0.21 | 0.36 |
| | **7** | 1.01 | 1.75 | 1.14 | 1.93 | 0.88 | 1.58 | 0.48 | 0.77 | 0.61 | 0.87 | 0.36 | 0.67 |

| | | Repetition | | | | | | Drop-Out | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | All | | Male | | Female | | All | | Male | | Female | |
| | | 03 | 07 | 03 | 07 | 03 | 07 | 03 | 07 | 03 | 07 | 03 | 07 |
| | 8 | 1.09 | 2.09 | 1.18 | 2.42 | 1.0 | 1.77 | 0.63 | 1.01 | 0.79 | 1.21 | 0.48 | 0.81 |
| | 9 | 1.21 | 2.07 | 1.28 | 2.59 | 1.15 | 1.56 | 0.94 | 1.35 | 1.11 | 1.52 | 0.77 | 1.18 |
| | 10 | 0.26 | 1.48 | 0.41 | 1.99 | 0.11 | 0.99 | 0.92 | 1.43 | 0.93 | 1.49 | 0.92 | 1.37 |
| **Secondary Cycle** | | 0.43 | 0.51 | 0.65 | 0.60 | 0.24 | 0.42 | 0.57 | 0.48 | 0.6 | 0.43 | 0.55 | 0.55 |
| **Grade** | 11 | 0.35 | 0.32 | 0.50 | 0.39 | 0.22 | 0.25 | 0.48 | 0.57 | 0.45 | 0.51 | 0.50 | 0.64 |
| | 12 | 0.50 | 0.68 | 0.79 | 0.78 | 0.25 | 0.56 | 0.66 | 0.41 | 0.74 | 0.35 | 0.59 | 0.46 |
| Source: MOE, 2003, 2007(to be checked and confirmed with MoE) | | | | | | | | | | | | | |

**Education policies and processes**

The intended goal of ERfKE was to change the structure and culture in education to achieve a major change. In order to observe that change, information was gathered on the status of the followings:

1. Characteristics of the current education policies and strategies
2. How the current internal processes are conducted and integrated
3. Current format and level of interaction and communication among all parties in the education system
4. Current process and procedures in selecting processes and interventions
5. Current level of effectiveness of polices and encouraging innovations
6. The current education climate
7. Structure and effectiveness of the current incentives and its association with performance

Before ERfKE, the following guides were shaping policies and decisions at MOE: (i) Objectives and strategies are derived from national legislation, plans, and regulations along with any vision of an improved state, which underpins these. (ii) The annual planning cycle, through which funds are released to achieve objectives and solve problems; and (iii) Events – problems and opportunities that require decisions and new policies.

There are three levels at which policy- and decision-making systems and methods are used:

- Executive decision-making
- Decision-making at central directorate level; and
- Decision-making at field directorate level.

The current situation analysis pointed to some weaknesses and limitations of the current procedures.

According to DCU report (Source: DCU, May 2007), the draft Framework for The National Education Strategy for General Education was completed in September 2003 and utilized as a resource for the development of the National Education Strategy Framework in February 2004. The initial draft NES document, based on the work done for the Framework and involving national consultations was finalized in Feb. 2005. Further work on the Strategy has been completed in late 2005 and refinements continued through 2006. The process of development and production of the Strategy have been substantially supported by both CIDA and USAID.

- Publication of the National Strategy was completed in the summer of 2006 and the documents (Comprehensive and Executive Summary versions) were distributed. Both documents were printed in Arabic and English. National Education Strategy awareness workshops were held in the North, Middle and South of Jordan. Teachers at 4 schools in each of the field directorates visited were oriented on NES. NES Revised by MDs and feed back collected, report submitted to SG. Approved comments will be incorporated in the updated version.

- A special MOE committee, supported by CIDA through their executing agency (SJE), was formed to develop a roadmap for the management of policy and strategic planning and change processes necessary to support the implementation of the National Education Strategy
- National Education Strategy awareness workshops were held in the North, Middle and South of Jordan. Teachers at 4 schools in each of the field directorates visited were oriented on NES
- Policy and Strategic Planning secretariat concept approved and offices equipped-a full-time local consultant began work in April 2007
- A policy dialogue process was established on ICT, e-content and appropriate ICT use to complete these draft policies and as a guide for future policy development
- Committees formulated at different levels under MDEP leadership to develop a rationale for management of policy and strategic planning and a Strategic Plan for 3 years 2008-2010
- Revised version of Policy and Strategic Planning Framework submitted to the Minister for his review with the Royal Committee
- Decision made to add PSPS to Moe Web page
- NES Revised by MDs and feed back collected, report submitted to SG.

**Executive decision-making**

The national structure of legislation and regulations shape the work of the executive level. When problems and queries reach the senior executives, first they are examined to see whether existing procedures, regulations and criteria can be applied to resolve the issue. While it is the norm that these issues, particularly where they involve individual employees, rarely reach a Minister's desk and are dealt with at lower levels, this may not always be the case within the MoE. The special individual concerns rose by political, parliamentary and media sources may require resolution at the executive level. Where existing procedures cannot resolve an issue, a committee is normally formed, not only to examine and answer the specific query but also often to establish principles and criteria (because of the lack of renewed and integrated education policies), so that a precedent for the future in such issues can be established. Committees also play an important part in the planning phase of new initiatives.

Outside the committee structure, there is no current system for providing systematic daily, weekly or monthly reports and/or briefings at the executive level. Also there is no solid (in terms of time and quality) system for providing regular, specific and up-to-date online summaries (e.g. statistical) and reports. The major regular data collection activity specifically for executive needs seems to be the "Briefing Papers" prepared before executive field visits. However, these are not

used for post-visit analyses or information updates. Other than these, there is no systematized feedback from the field directorates.

Secretary-Generals receive annual plans from the managing directors (MDs) and provide a framework for tracking progress and assessing performance. However, performance indicators and benchmarks have not as yet been developed to facilitate performance appraisal. More generally, follow-up and monitoring procedures are inhibited by the lack of a national inspection system and an effective management information system. Currently there is no systematic approach or special unit to develop and maintain performance monitoring and the development of indicators. Before ERfKE, the central Ministry was not used to receiving regular feedback on system performance. Although there is a Research Directorate in MoE, it is not commissioned to undertake problem- or policy-focused research and other investigations. Also there was no research budget or competent research staff available to provide this type of decision support.

There is no specialization within the immediate executive support structures – their offices. Specialist's help (whether technical, research, planning or media relations), used to be obtained from the directorates. The culture of special advisers, common in many Ministries of Education, does not seem to be well established in MoE. It is clear the need for reinforcing an executive support within and across the directorates rather than building up a "specialist/special adviser" structure at the executive level, as recommended in the National Education Strategy.

One consequence of the current lack of systematic support at the executive level is the very heavy workload demanded of the MoE's most senior executives. The baseline situation could be summarized as lacking to:

- a focused strategic policy and planning structures,
- a systematic planning procedures, which are based on accurate and current evidence,
- a strong focus on quality improvement and strategic planning throughout the central Ministry, with much less involvement in operational matters, particularly at executive level.
-

During ERfKE I, DfID's support to ERfKE activities was located within its support for the Public Sector Reform Program in Jordan. The contractor, PricewaterhouseCoopers, submitted an Implementation plan to MOE in May 2004 with MOE initiatives focused on three pilots: Planning and Budgeting, Decentralization and School Management and Teacher Selection and Appraisal. The work with the pilots was completed in June 2005 and the responsibility for technical assistance was transferred to the incoming CIDA Executing Agency (Bearing Point/SJE). SJE has expanded the work of the pilots to support MoE in the exploration of all key areas of organizational change through a series of seven specific areas of work with various directorates. Recent highlights of the work are:

- Result-Oriented Budgeting and Planning mechanisms were developed for KGs, Special Education and Vocational Education
- A Leadership Program was designed and the first phase implemented: 12 facilitators were trained to deliver the full leadership program in 2007. All MDs received training. Preliminary review of Leadership Program completed. 88 women completed training in 3 modules

- A MoE Technical Team was trained on Gender Mainstreaming. The Team reviewed MoE curriculum, training and resource documents and provided recommendations to promote gender equality in education throughout the system. A gender analysis determined an absence of women leaders- a "Women Leaders in the Ministry of Education-Status and Prospects" forum was therefore held in Dec 2006. Workshops reviewing the forum recommendations to develop relevant MoE policies, strategies and actions were held early 2007
- MoE's Budget for the three years 2008-2010 prepared according to MTEF approach and this is in line with the overall gov. plans to utilize RBM and MTEF
- A draft strategy, policy and implementation strategy for GM was prepared by GETT supported by SJE and will be submitted to SC soon
- GM tools were designed and printed to be distributed to MOE staff soon
- Posters with gender equality messages designed, printed and distributed to Jerash, Albadia and ALMafraq schools, will be distributed to other Directorates soon
- GETT attended 2 workshops and developed Gender Training Modules
- GETT developed Gender Policy and Strategy
- GETT conducted training workshops on gender analyses for 40 Head Divisions from Directorates of the Middle Region
- GETT issued an Edition of the Gender Newsletter
- Gender Policy and Strategy approved
- A Performance Management Development Program has been developed in the 2 pilot field directorates and 17 key officials have been trained
- Field Directorate Governance and Management Program is implemented in the 2 pilot field directorates
- Draft field directorate improvement plans prepared for Jerash and Badie Al Wusta and draft school improvement plans prepared for 40 schools. Seventy-six new schools were added to the program
- All schools in Jerash and Al Badia Al –Wusta are now involved in the program
- 120 School Improvement Plans completed
- A special Fund awarded to support specific improvement plan activities and concerned staff in the 2 Districts were trained on the Guidelines to manage the fund
- School and District Improvement Program extended to the three Mafraq districts started implementation of a modified approach based on the lessons learned from Jerash and Al Badia
- Foundation Leadership training conducted in AL MAFRAQ 3 Districts for 78 supervisors from which 16 were chosen as facilitators to deliver the training to the members of the central working group in each of the three districts
- A professional development program unit established in South El Aghwar.
- Awareness for school development in created in South El Aghwar
- MOE/DTQS is working on developing a Jordanian Model for District and School Development with the support of SJE to be implemented in ERfKE II in the 6 Directorates and all the rest according to the implementation plan

**Finance**

There are internal procedures through Planning & Finance directorates, together with external control from Ministry of Finance. It is very complicated to provide forecasts, simulations and impact models of alternative models of educational expenditure and distribution. There are insufficient efforts to conduct long-term analyses of full implications of new initiatives (including donor assistance). Budget is still aggregated and lacks a unified budget management & monitoring system, based on activity-based budgeting. Finances are aggregated or grouped in lumps, which make it almost impossible to get accurate, or actual (not estimated) figures for smaller groups. For example there are finances for basic education as a whole but hard to get it for one of the 10 basic years.

**Examinations**

Before ERfKE, only teacher-based tests and national grade 12 (Tawjehi) examinations took place. Two parallel record systems (school and MOE). There is no comparison of examination outcomes and student performance on subject-by-subject, school-by-school and even class-by-class at the different levels: national, regional, and by gender. A national test is also conducted but not systematically analyzed. The country participated in international exams such as TIMSS 1999 and 2003 but curriculum and learning were assessed below international standards (although slightly above average in science).

During ERfKE, the country participated in two international benchmarks studies, TIMSS 2007 and PISA 2006 (Program for International Student Assessment). There has been development and partial implementation of the National Assessment Policy including classroom assessment, national testing program, the National Exit Examination (the Tawjihi), and indicators of student performance. Two major national examinations were also developed and conducted. A census of $4^{th}$ graders at all schools in the country participated in a national assessment and another was conducted for $10^{th}$ grades. In order to assess students in the knowledge economy skills introduced by ERfKE, NAfKE (National Assessment of Knowledge Economy Skills) was introduced and conducted twice (2006 and 2008) for grades 5, 9, and 11.

A training package on new assessment strategies and tools for principals and supervisors in the field was created and initiated in July 2007. Electronic archives of data for 2006/2007 national tests, test papers and statistical reports completed in Sept. 2007. Classroom Assessment Policy was updated to include the grades involved in the developed curriculum implementation (3,6,7). Also MoE has developed student performance indicators (with support from the Education Testing Services (ETS) in collaboration with SJE, and items were developed for piloting in 4 subjects: Arabic, Math, English, and Science for grades 4,8,10, and 12. Supervisors and teachers were trained on Learning Styles and Diagnostic Tests.

Student performance "portfolios" were piloted by the Directorate of Examinations and Testing for Grades 3,6,9, in (Arabic, Math, Science), and MIS Grade 11 in (Basic Management and Accounting) and 5 directorates started to implement portfolio in their schools (DCU, March 2009). Several initiatives for capacity building of DET staff were identified and implemented.

**Curriculum**
Before ERfKE, the curriculum has been traditional and content-based. There were insufficient activities to examine alternative curriculum development strategies & priorities and evaluate their impact. Curriculum was content-based and not based on a well-defined and planned set of learning outcomes and expected skills.

During ERfKE, a new strategy for curriculum was created and adopted. It was based on learning outcomes. New curriculum was created and phased out for all K-11 grades. E-content was also developed and introduced as part of ERfKE.

During ERfKE attention was also given to special education. Several capacity building activities at MOE directorates were conducted targeting Mild Mental Retardation, Severe to Profound Mental Retardation, Learning Disabilities, Gifted, Special Needs and Career Counseling. Special Needs technical assistance were conducted in areas of program development about visual and hearing loss, program development counseling- violence prevention, program evaluation - pioneer centers and resource rooms.

**Schools**
During ERfKE, in terms of construction and renovation of schools the following were achieved:

World Bank: 41 new schools
World Bank extensions
Phase I: 71 packages, 392 schools
Phase II:13 Packages, 72 schools and 9 packages, 55 schools)
Phase III: 20 Packages, 19 packages delivered and one package still under construction expected to be completed by the end of June.

European Investment Bank: 41 schools delivered, 2 cancelled, and 2 failed to be completed by the contractor.

Arab Fund: 38 schools completed, equipped and furnished, and operational

Islamic Development Bank: 25 Schools delivered, furnished and equipped

KFW: (12) schools delivered equipped and furnished.

USAID schools (28 new schools) and renovation for 100 schools: 16 schools are under construction, 12 schools in design stage, 13 extensions in Aqaba under construction, 7 extensions in Amman delivered, 8 schools in procurement process.
USAID construction program has been reflected under ERfKE II

**Personnel**
Before ERfKE, statistics on student-teacher ratios and class size indicated that there has been teacher shortages and new teachers relatively untrained. Quality of teachers with degree from teacher education colleges is relatively low. Teacher appointments are not school-based and appraisals not used for quality assurance. It lacks a continuous process and a system to provide

evidence of benefits of different models of teacher-training that enable comparisons between alternative models of teacher selection, deployment, and appraisal. The teacher is also not seriously involved in decision making especially in major issues related to their affairs, the curriculum, student performance, instructional creativity, and on setting up new educational policies.

During ERfKE, a National Training Plan was completed (in September 2004) and it encompassed all elements of teacher ranking, incentive, preparation, and in-service professional development. The Plan was essential to align professional development activities under the Integrated Plan. The implementation of the Plan has significantly changed the role of the Directorate of Training, Supervision, and Qualifications from one of logistical support for training to one of responsibility for training standards and deployment. The development of the Plan also led to an increased emphasis on teacher preparation and closer ties between the MOE and the faculties of education at the universities. Considerable progress has been achieved and includes:

- Study tours (e.g. to Canada, Singapore and Korea) aimed at learning more on the development of curriculum leadership and learning resources, authoring and building capacity of staff in the Directorate of Curricula and Textbooks in subjects (Science, Math e-Learning and Humanities)
- A School Development Unit (SDU) program was prepared at DTQS implemented in three phases at regions: middle, North, and South.
- 72 schools in 3 regions were trained to be leaders in their field directorate, SDU team in each school was established.
- A central team trained 654 other core teams in 35 directorates who then trained 54,000 teachers on new curricula and assessment methodology
- 85,118 teachers trained on ICDL 55,000 teachers are now ICDL certified, 57,738 teachers and supervisors trained on INTEL,7,702 are certified, 200 teachers trained on CADER-MIS Program 59 passed the exam, 541 teachers are engaged in Universities CADER Program, and 2,583 trainees completed training on World Links1,**820** are certified. Currently , 570 teachers start training on TOT INTEL Teach on line and 3000 teachers start training including thinking tools, on-line and essential INTEL.
- Specific training in MIS, English language instruction, and implementation of JEI e-learning subjects were conducted by MoE partner agencies (ESP, JEI, British Council)
- 2 Universities adapted the pre-service teacher training that was developed in May 2006 and a joint committee from MoE and universities was formed to discuss the domains of the pre-service training plan. Since that time no progress achieved.
- Teachers Academy was initiated for pre-service and in-service teacher training (Sept. 2007) ,ETC legislation system approved by the Cabinet ,criteria for selection of the staff is prepared and draft structure of ETC is set
- 74 teachers trained on designing and writing material for 6 programs ( Science, Mathematic, English, Arabic, first three grades and school principals ) to be established in the Academy
- 3000 newly appointed teacher were trained for 14 days to be followed by practical training in schools starting the scholastic year 2008/2009

- Integration of the new standards into training programs was completed. Restructuring the training programs into five main domains Academic, ICT, Pedagogy, individual needs, and General Culture.
- The PDP in both districts (Badia Wosta and Jerash) now operational with guidelines for operation. The majority of district and school capacity building programs underway through the other three districts in –Mafraq and new one in South Alghwar
- Re-activation of the current vocational education system to include: a review and development of the current vocational programs to be consistent with ERfKE's vocational educational policies, develop specialized training programs for supervisors, in-service and new teachers, build capacity of the Directorate staff and merge special needs education with vocational education
- A database was prepared by DTQS to identify teachers experience through provided programs
- A new MoE Model school and districts based management approved by the minister (May 2009)
- 64 teachers and supervisors trained on developing curriculum learning materials for science education utilizing ICT and lab activity (March 2008) through SEED project with JICA.
- Steering and Technical committees ere established to review all programs and link them with the ranking system through Professional Development Program.

**Supplies**

The current supply system is paper-based with no unified inventory control and ineffective distribution systems. There is no system for inventory management or analysis to compare alternative resource based on management models.

**Information and data management**

Despite the several initiatives and education reforms to effectively maintain and manage educational indicators and data, ERfKE started during a period in which the annual education statistics handbook takes up to two years to produce. Information is not systematically nor effectively used in decision making because accurate and real figures are not easily accessible. Data is not efficiently centralized and in most cases not electronically stored. Extracting information was mainly manual and not purely electronic.

Indicators related to policy and decision making at the school level are extracted from TIMSS 2003 and 2007 studies. Information was gathered from the school principal. Information on the following has been assessed:

1. The decisions in hiring and firing of teachers and incentives to hire, based on TIMSS results, are centralized and table 1 shows the difficulty level in filling vacancies:

**Table 1: Difficulty level in filling vacancies**

| | Were no vacancies in this subject | | Easy to fill vacancies | | Somewhat difficult | | Very difficult | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Mathematics | 28 | 27 | 50 | 44.4 | 17 | 24 | 5 | 4.6 |
| b) Science | 44 | 25.6 | 46 | 44.1 | 17 | 24.6 | 3 | 5.6 |
| c) Computer science/ information technology | 19 | 26.2 | 49 | 49.2 | 22 | 20.5 | 11 | 4.1 |

2. Schools don't use incentives (e.g., pay, housing, signing bonus) to recruit or retain teachers in the fields of: mathematics, science, and computer science. Table 2 shows the lack of incentive in this regard:

**Table 2: Percentage of schools which does not currently use any incentives (e.g., pay, housing, signing bonus) to recruit or retain <eighth-grade>teachers in the following fields?**

| | Percentage | |
|---|---|---|
| | **03** | **07** |
| a) Mathematics | 99 | 89.7 |
| b) Science | 99 | 89.2 |
| c) Other | 96 | 85.1 |

MOE and the directorates design school important goals, curriculum policies, content knowledge, teaching skills, information technology skills (centralized decision making process)

3. School management is the responsibility of the school principal under the directions of the MOE. Time allocation for the principal of a school is summarized in Table 3. The table shows the percentage of principal time spent on administrative duties (e.g. hiring, budgeting, scheduling); on instructional leadership (e.g., developing curriculum and pedagogy); supervising and evaluating teachers an other staff; teaching; on public relations and fundraising; and on doing other duties.

| **Table 3: Principal time spent on these activities:** | **%** | |
|---|---|---|
| | **03** | **07** |
| a) Administrative duties (e.g., hiring, budgeting, scheduling) | 24 | **21.13** |
| b) Instructional leadership (e.g., developing curriculum and pedagogy) | 21 | **16.56** |
| c) Supervising and evaluating teachers and other staff | 24 | **30.13** |
| d) Teaching | 8 | **10.55** |
| e) Public relations and fundraising | 14 | **11.68** |
| f) Other | 10 | **9.98** |
| **Average principal time on the job (years)** | 5 | |

School schedule and assignments can be described as in Table 4:

**Table 4: School schedule**

| | 03 | 07 |
|---|---|---|
| Days per year is your school open for instruction | 187 | 196 |
| Instructional days per week | 5 days | 5 days |
| Teacher load (in a typical calendar week, the total number of single periods for which teachers are formally <scheduled/time-tabled/assigned>? | 22 | 20 |
| Minutes in a typical single period | 45 | 45 |

Tables 6a and 6b show the teaching time including responsibilities outside the classroom and their interaction.

**Table 6: Teacher time allocation**

| | 03 | 07 |
|---|---|---|
| How many students are in the TIMSS class? | 36 | 34 |
| How many minutes per week do you teach mathematics to the TIMSS class? | 180 | 223 |
| How many minutes per week do you teach science to the TIMSS class? | 221 | 223 |

**How often do you have the following types of interactions with other teachers?**

| | Never or almost never | | 2 or 3 times per month | | 1-3 times per week | | Daily or almost daily | |
|---|---|---|---|---|---|---|---|---|
| **Math teachers** | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Discussions about how to teach a particular concept | 9 | 10.1 | 39 | 43.7 | 34 | 35.2 | 18 | 11.1 |
| b) Working on preparing instructional materials | 20 | 21.1 | 45 | 42.2 | 18 | 27.6 | 17 | 8.5 |
| c) Visits to another teacher's classroom to observe his/her teaching | 31 | 29.5 | 57 | 53 | 11 | 15 | 1 | 2.5 |
| d) Informal observations of my classroom by another teacher - | 56 | 42.2 | 34 | 26.1 | 7 | 17.1 | 3 | 14.6 |
| **Science teachers** | | | | | | | | |
| a) Discussions about how to teach a particular concept | 5 | 9.5 | 31 | 38 | 41 | 38.5 | 22 | 14 |
| b) Working on preparing instructional materials | 5 | 11 | 45 | 29.5 | 26 | 33.5 | 25 | 26 |
| c) Visits to another teacher's classroom to observe his/her teaching | 34 | 31.5 | 63 | 54 | 2 | 12 | 1 | 2.5 |
| d) Informal observations of my classroom by another teacher | 53 | 38.5 | 40 | 39.5 | 5 | 14 | 2 | 7 |

**Situation on availability/use of technology mastery level of skills at schools**

Ministry of Education has also been collecting IT statistics at schools. Currently all schools have computers (via one, two, three or more computer labs) and the number of schools that are connected to the national network is 2,553 (ADSL: 2345, leased line: 134, ISDN: 74). A learning management (EDUWAVE) is installed and hosts the e-content. Computers were used at schools or homes before the ERfKE project.

The following table shows a comparison between 2004 and 2008 based on the ICT SITES studies. A clear change in ICT utilization is observed between the two years.

| 2008 | | 2004 | |
|---|---|---|---|
| **Indicator** | **Value** | **Comparative Indicator** | **Value** |
| Intranet | 86% | Intranet | 0% |
| Internet Connection | 72% | Internet | 37% |
| Learning management system (e.g. Eduwave) | 90% | | 0% |
| Have one or two labs | 79% | Access to computer lab with more than 15 PCs | 67% |
| Don't have computer lab | 1.4% | Don't have computer lab | 33% |
| Student per pc | 15 | | 35 |
| Classroom not equipped with ICT | 88% | | 100% |
| 21%-22% of their classroom are equipped with ICT | 4% | | |
| Use of innovative pedagogical practices and creative work | 65% | Use of innovative pedagogical practices (student learn by doing, independent learning, learning to search for information, etc.) | 33% |
| Plans regarding hardware or software maintenance are available | 61% | | 0% or N/A |
| Computer labs occupied a day for:<br>4 classes or more<br>2-3 classes<br>1 class | <br>58%<br>25%<br>7% | Problem in scheduling enough computer time for diff classes | 79% |

| 2008 | | 2004 | |
|---|---|---|---|
| **Indicator** | **Value** | **Comparative Indicator** | **Value** |
| Percentage of classroom use ICT equipment | 65%-73% | | ~0% |
| Word processing | 89% | Word processing<br>Power point 91%<br>Word processing 89%<br>Professional drawing 89%<br>Spread sheets packages 61% | 93% |
| animation multimedia 71% | 65% | Graphic design 89%<br>Multimedia computer 95%<br>Interactive encyclopedia 58% | |
| programming | 56% | Programming skills<br>Prog. languages 80% | 57% |
| Used ICT for scheduling | 79% | Lesson schedule | 78% |
| Used ICT for staffing | 91% | Staff administration | 76% |
| Used ICT for communication | 62% | Communication with parents | 61% |
| Used ICT for writing documents | 95% | Updating library data | 56% |
| Used ICT to reporting grades | 97% | | 0% |
| Used ICT to track attendance | 34% | | 0% |
| Used ICT to maintain budget | 79% | Use of ICT in financial administration | 60% |
| **Obstacles** | | | |
| Unfriendly and complicated software | 91% | Not enough computer | 88% |
| Teacher unawareness of the use of PCs in education | 88% | Not enough type variety of software | 72% |
| Unfocused educational software | 81% | Not enough copies software | 80% |
| Heavy teaching load | 81% | Insufficient teach time | 82% |

From TIMSS, Table 8 shows data on the availability and use of hardware and software at school.

| **Table 8: Availability of ICT Resources** | | |
|---|---|---|
| | **03** | **07** |
| Average, total number of computers at school that can be used for educational purposes by <eighth-grade> students? | **16** | **30.39** |
| % of computers has access to the Internet (e-mail or World Wide Web) for educational purposes? | | |
| All | 14 | **45.7** |
| Most | 4 | **23.9** |
| Some | 0 | **11.7** |
| None | 82 | **18.8** |

The perception of shortage in ICT material for instructions is characterized in Table 9.

**Table 9: Is school's capacity to provide instruction affected by a shortage or inadequacy of the following ICT equipments:**

| | **None** | | **A little** | | **Some** | | **A lot** | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| Computers for mathematics instruction | 31 | 42.6 | 24 | 23.4 | 22 | 14.7 | 23 | 19.3 |
| Computer software for mathematics instruction | 31 | 26.5 | 24 | 34.2 | 23 | 19.4 | 23 | 19.9 |
| Calculators for mathematics instruction | 39 | 27.6 | 25 | 27 | 19 | 21.9 | 16 | 23.9 |
| Audio-visual resources for math instructions | 32 | 19.8 | 31 | 18.8 | 24 | 20.8 | 13 | 40.6 |
| Computers for science instruction | 30 | 42.9 | 26 | 19.7 | 23 | 26.2 | 22 | 11.2 |
| Computer software for science instruction | 30 | 25.3 | 23 | 33.8 | 24 | 21.2 | 23 | 19.7 |
| Calculators for science instructions | 35 | 23.1 | 36 | 30.8 | 14 | 16.9 | 16 | 29.2 |
| Audio-visual resources for science instructions | 23 | 25.9 | 34 | 22.8 | 23 | 19.3 | 19 | 32 |
| Computer support staff | 32 | 37.9 | 21 | 27.7 | 25 | 17.9 | 22 | 16.4 |

Students' usage of computers is estimated in Table 10:

| **Table 10 (a): Student's use of computers** | | | | |
|---|---|---|---|---|
| **Do you ever use a computer? (Do not include PlayStation®, GameCube®, XBox®, or other TV/video game computers).** | | | | **Yes** 94.9 |
| **Where do students use a computer?** Yes | | | No | |
| | **03** | **07** | **03** | **07** |
| a) At home | 45 | 75.1 | 55 | 24.9 |
| b) At school* | 83 | 82.5 | 17 | 17.5 |
| c) At a library | 12 | | 88 | |
| d) At a friend's home | 44 | | 56 | |
| e) At an Internet café | 33 | | 67 | |
| f) Elsewhere | 39 | 35.7 | 61 | 64.3 |
| * might be for the required computer class | | | | |

**Use of new pedagogy**

Over the life of ERfKE several pedagogical initiatives were introduced. MoE in collaboration with a national university, Yarmouk University, prepared a cadre of new teachers who are trained on the new pedagogical theory and practice with the use of new technologies. When those teachers were observed and compared to their peers at same schools, superior characteristics were confirmed.

From TIMSS the percentage of teachers using ICT for educational purposes are shown in Table 11.

**Table 11: Teachers use of computers**

| **Do students in the TIMSS class have:** | **Yes** | | **No** | |
|---|---|---|---|---|
| | **03** | **07** | **03** | **07** |
| **Computers available to use during their mathematics lessons?** | 5 | 29 | 95 | 71 |
| **Do any of the computers have access to the Internet?** | 35 | 52.6 | 65 | 47.4 |

**In teaching mathematics to the TIMSS class, how often do you have students use a computer for the following activities?**

| | **Every or almost every lesson** | | **About half the lessons** | | **Some lessons** | | **Never** | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Discover mathematics principles and concepts | 0 | 7 | 0 | 10.5 | 65 | 70.2 | 35 | 12.3 |
| b) Practice skills and procedures | 0 | 7 | 0 | 29.8 | 65 | 52.6 | 35 | 10.5 |
| c) Look up ideas and information | 0 | 7 | 0 | 14 | 65 | 71.9 | 35 | 7 |
| d) Process and analyze data | 0 | 7 | 0 | 15.8 | 35 | 59.6 | 65 | 17.5 |

**Science**

| | Yes | | No | |
|---|---|---|---|---|
| | **03** | **07** | **03** | **07** |
| Do students in the TIMSS class have computers available to use during their science lessons? | 16 | 21.3 | 84 | 78.7 |
| Do any of the computers have access to the Internet? | 18 | 81.0 | 82 | 19.0 |

| **In teaching science to the <TIMSS class>, how often do you have students use a computer for the following activities?** | **Never** | | **Some lessons** | | **About half the lessons** | | **Every or almost every lesson** | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Do scientific procedures or experiments | 12 | 7.1 | 0 | 66.7 | 23 | 21.4 | 65 | 4.8 |
| b) Study natural phenomena through simulations | 14 | 7.1 | 0 | 66.7 | 46 | 21.4 | 40 | 4.8 |
| c) Practice skills and procedures | 14 | 7.3 | 0 | 65.9 | 45 | 17.1 | 42 | 9.8 |
| d) Look up ideas and information | 7 | 0 | 16 | 50 | 38 | 33.3 | 40 | 16.7 |
| e) Process and analyze data | 14 | 4.8 | 0 | 61.9 | 31 | 23.8 | 56 | 9.5 |

**Current availability of KGs and ECD services**

In this regard Table 12 shows:
1. Percentage of children attending KG
2. Percentage of children attending ECD services
3. Percentage of children taught by trained cadre
4. Number of trained cadre
5. Type and quality (strengths and weaknesses) of KG administration

| **Table 12: Current availability of KGs and ECD services** | | |
|---|---|---|
| | **%** | |
| | **03** | **07** |
| Net Enrollment Rate | 33.1% | *32.6%* |
| Gross Enrollment Rate | 36.0% | *35.4%* |
| Child-teacher ratio at KG/MOE | 4% | 19.4 |
| Child-teacher ratio at KG/Kingdom | 5% | 19.8 |
| Number of KGs | ? | 4726 |
| Number of public KGs in rural areas | 0 | 359 |

Current indicators on ECD material and resources:
1. Number of current standardized textbooks
2. Type of current textbooks used at KGs
3. Type and quality of ECD material
4. Type and current teaching methods
5. Type of teaching methodology

Other qualitative and quantitative information is available in the UNICEF's paper "status of ECD in Jordan 2003"

**Current physical infrastructure, conditions, issues and availability of school**

During ERfKE, new schools were built, renovated, and extended. Table 13 contains data on the following:

1. Percentage of students in double shift
2. Percentage of schools with science labs
3. Percentage of crowded schools
4. Average number of students per square meter
5. Student teacher ratio
6. Percentage of school in need for rehabilitation
7. Shortage of schools
8. Student's regard for school property

| **Table 13: Current physical infrastructure, conditions, issues and availability of school** | | | |
|---|---|---|---|
| | **03** | **07*** | |
| Percentage of students in double shift | 13% | | |
| Percentage of students in rented class units | 11% | | |
| Percentage of schools with science labs | 48% | | |
| Percentage of overcrowded schools | 46% | | Student per square>1.2 |
| Average number of students per square meter | 0.74 | | |
| Average school size | 351 | | TIMSS (780) |
| Student teacher ratio | 19 | | |
| Student class-unit ratio | 29 | | |
| Percentage of schools in need for rehabilitation | 10% | | |
| Percentage of school without heating/air-conditioning | 100% | | |
| Percentage of school without electricity | 2% | | |
| Shortage of schools (number of schools) | 400 | | |
| **Source: Education Statistics, MOE**<br>*** not finalized yet** | | | |

Also the following two tables show the student-teacher and student-class ratios by governorates and urban-rural:

| **Student-Teacher Unit Ratio by Governorate** | | |
|---|---|---|
| **Governorate** | **Total** | |
| | **03** | **07** |
| **Grand Total** | 18.7 | 17.7 |
| **Capital** | 21.8 | 22.2 |
| **Madaba** | 15.5 | 15.6 |
| **Zarqa** | 23 | 23.9 |

| Student-Teacher Unit Ratio by Governorate | | |
|---|---|---|
| **Governorate** | **Total** | |
| | **03** | **07** |
| **Balqa** | 17.1 | 16.5 |
| **Irbid** | 18.4 | 16.8 |
| **Jarash** | 17.8 | 14.7 |
| **Ajloun** | 17.9 | 16.5 |
| **Mafraq** | 14.3 | 12.5 |
| **Karak** | 13.7 | 12.5 |
| **Tafila** | 14.5 | 12.2 |
| **Maan** | 13.6 | 11.2 |
| **Aqaba** | 20 | 17.8 |

| **Student-Class Unit Ratio by Governorate** | | |
|---|---|---|
| **Governorate** | **Total** | |
| | **2003** | **2007** |
| **Grand Total** | **28.9** | **27.5** |
| **Capital** | **32.9** | **28.5** |
| **Madaba** | **24.6** | **24.4** |
| **Zarqa** | **33.9** | **31.4** |
| **Balqa** | **26.1** | **26.5** |
| **Irbid** | **29.4** | **27.6** |
| **Jarash** | **25.8** | **24.6** |
| **Ajloun** | **27.3** | **25.5** |
| **Mafraq** | **21.6** | **19.2** |
| **Karak** | **23.2** | **21.5** |
| **Tafila** | **25.1** | **22.4** |
| **Maan** | **20.5** | **18.7** |
| **Aqaba** | **31.2** | **27.8** |

From TIMSS, we use the following information about schools:

1. school condition and environment
2. school size
3. heating/lighting
4. instructional material

Also, Table 14 shows how the school capacity to provide information is affected by shortage or inadequacy of the following:

1. Instructional material
2. budget and supplied
3. school buildings and grounds
4. heating/cooling and lighting systems
5. Instructional space (e.g., classrooms)
6. Special equipment for handicapped students
7. Computers for instruction
8. Computer software for instruction
9. Library materials relevant to instruction
10. Audio-visual resources for instruction
11. Science laboratory equipment and material
12. Calculators for instructions
13. Teachers
14. Computer support staff

**Table 14: Is school's capacity to provide instruction affected by a shortage or inadequacy of any of the following?**

| | None | | A little | | Some | | A lot | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Instructional materials (e.g., textbook) | 26 | 82.0 | 14 | 14.0 | 18 | 4.0 | 42 | 0 |
| b) Budget for supplies (e.g., paper, pencils) | 36 | 71.0 | 35 | 18.0 | 21 | 8.5 | 8 | 2.5 |
| c) School buildings and grounds | 22 | 40.0 | 30 | 25.5 | 20 | 12.0 | 29 | 22.5 |
| d) lighting systems, heating and cooling | 17 | 13.7 | 24 | 21.3 | 30 | 16.8 | 29 | 48.2 |
| e) Instructional space (e.g., classrooms) | 24 | 48.5 | 19 | 20.5 | 31 | 17.0 | 26 | 14.0 |
| f) Special equipment for handicapped students | 40 | 30.7 | 21 | 15.6 | 17 | 9.4 | 22 | 44.3 |
| g) Computers for mathematics instruction | 31 | 42.6 | 24 | 23.4 | 22 | 14.7 | 23 | 19.3 |
| h) Computer software for mathematics instruction | 31 | 26.5 | 24 | 34.2 | 23 | 19.4 | 23 | 19.9 |
| i) Calculators for mathematics instruction | 39 | 27.6 | 25 | 27.0 | 19 | 21.9 | 16 | 23.5 |
| j) Library materials relevant to mathematics instruction | 23 | 27.3 | 51 | 37.9 | 20 | 22.2 | 7 | 12.6 |
| k) Audio-visual resources for mathematics instruction | 32 | 19.8 | 31 | 18.8 | 24 | 20.8 | 13 | 40.6 |
| l) Science laboratory equipment and materials | 20 | 45.2 | 17 | 30.7 | 22 | 18.6 | 42 | 5.5 |
| m) Computers for science instruction | 30 | 37.6 | 26 | 21.3 | 23 | 20.3 | 22 | 20.8 |
| n) Computer software for science instruction | 30 | 25.3 | 23 | 33.8 | 24 | 21.2 | 23 | 19.7 |
| o) Calculators for science instruction | 35 | 23.1 | 36 | 30.8 | 14 | 16.9 | 16 | 29.2 |
| p) Library materials relevant to science instruction | 24 | 27.4 | 46 | 38.6 | 21 | 22.3 | 10 | 11.7 |
| q) Audio-visual resources for science instruction | 23 | 25.9 | 34 | 22.8 | 23 | 19.3 | 19 | 32.0 |
| r) Teachers | 19 | 66.8 | 16 | 20.4 | 5 | 9.4 | 60 | 3.1 |
| s) Computer support staff | 32 | 37.9 | 21 | 27.7 | 25 | 17.9 | 22 | 16.4 |

Perception of teachers of school conditions is described in Table 15 about:

- School facility is in need of significant repair
- The school is located in a safe neighborhood

- I feel safe at this school
- The school's security policies and practices are sufficient

**Table 15: Thinking about your CURRENT school, indicate the extent to which you agree or disagree with each of the following statements.**

| | Agree a lot | | Agree | | Disagree | | Disagree a lot | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) This school facility (building and grounds) is in need of significant repair | 28 | | 41 | | 26 | | 5 | |
| b) A safe neighborhood | 35 | 44.2 | 48 | 42.7 | 13 | 6.5 | 4 | 6.5 |
| c) I feel safe at this school | 36 | 47.6 | 51 | 40.3 | 9 | 9.8 | 4 | 2.3 |
| d) This school's security policies and practices are sufficient | 24 | 38.2 | 61 | 42.2 | 12 | 14.3 | 2 | 5.3 |

**Level of morale and enthusiasm to teaching and students self belonging at school**

From TIMSS, we obtained information on:

1. General school climate, learning environments, teachers' interest and morale, teacher job satisfaction, teachers' degree of success in implementing the school's curriculum and teachers understanding of goals (Table 16)
2.

**Table 16 (a): Principals perception of school climate (percentages)**

| | Very high | | High | | Medium | | Low | | Very Low | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Teachers' job satisfaction | 8 | 13.1 | 45 | 59.8 | 38 | 24.1 | 8 | 2.0 | 0.9 | 1.0 |
| b) Teachers' understanding of the school's curricular goals | 11 | 18.0 | 70 | 62.0 | 16 | 18.5 | 3 | 1.5 | 0 | 0 |
| c) Teachers' degree of success in implementing the school's curriculum | 20 | 21.1 | 64 | 67.8 | 14 | 10.1 | 2 | 0.5 | 0 | 0.5 |
| d) Teachers' expectations for student achievement | 8 | 7.6 | 51 | 52.0 | 38 | 38.4 | 4 | 1.5 | 0 | 0.5 |
| e) Parental support for student achievement | 4 | 5.5 | 17 | 24.0 | 50 | 50.5 | 24 | 15.5 | 5 | 4.5 |
| f) Parental involvement in school activities | 2 | 5.5 | 17 | 22.1 | 36 | 49.2 | 33 | 19.1 | 14 | 4.0 |
| g) Students' regard for school property | 4 | 6.0 | 42 | 35.0 | 37 | 45.0 | 13 | 10.5 | 5 | 3.5 |
| h) Students' desire to do well in school | 9 | 8.5 | 50 | 46.0 | 36 | 41.0 | 6 | 4.0 | 0 | 0.5 |

| Table (b): Teachers perception of school climate: How teachers characterize each of the following within their school? | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Very high | | High | | Medium | | Low | | Very low | |
| **Mathematics** | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Teachers' job satisfaction | 2 | 15.6 | 24 | 39.2 | 41 | 36.2 | 22 | 7.2 | 11 | 1.5 |
| b) Teachers' understanding of the school's curricular goals | 9 | 23.1 | 64 | 49.2 | 22 | 26.1 | 5 | 1.5 | 0 | 0 |
| c) Teachers' degree of success in implementing the school's curriculum | 13 | 18.6 | 50 | 51.8 | 32 | 27.1 | 6 | 2.5 | 0 | 0 |
| d) Teachers' expectations for student achievement | 15 | 10.6 | 36 | 41.7 | 39 | 40.7 | 8 | 6.0 | 3 | 1.0 |
| e) Parental support for student achievement | 2 | 2.5 | 3 | 15.6 | 40 | 38.2 | 40 | 27.6 | 16 | 16.1 |
| f) Parental involvement in school activities | 3 | 1.5 | 7 | 11.1 | 28 | 32.2 | 36 | 30.2 | 26 | 25.1 |
| g) Students' regard for school property | 2 | 3.0 | 19 | 16.1 | 44 | 43.2 | 22 | 22.6 | 13 | 15.1 |
| h) Students' desire to do well in school | 4 | 3.5 | 20 | 19.1 | 49 | 49.7 | 20 | 20.6 | 8 | 7.0 |
| **Science** | | | | | | | | | | |
| a) Teachers' job satisfaction | 5 | 12.1 | 17 | 38.7 | 42 | 36.7 | 22 | 6.0 | 13 | 6.5 |
| b) Teachers' understanding of the school's curricular goals | 13 | 18.6 | 51 | 45.2 | 30 | 31.7 | 5 | 4.0 | 1 | 0.5 |
| c) Teachers' degree of success in implementing the school's curriculum | 16 | 17.2 | 51 | 45.5 | 29 | 33.8 | 4 | 3.0 | 0 | 0.5 |
| d) Teachers' expectations for student achievement | 16 | 9.0 | 40 | 38.2 | 33 | 46.7 | 9 | 5.5 | 2 | 0.5 |
| e) Parental support for student achievement | 2 | 1.5 | 6 | 17.1 | 45 | 38.2 | 32 | 28.6 | 16 | 14.6 |
| f) Parental involvement in school activities | 2 | 2.0 | 4 | 14.1 | 31 | 32.3 | 35 | 28.3 | 28 | 23.2 |
| g) Students' regard for school property | 1 | 4.0 | 15 | 17.6 | 37 | 37.2 | 34 | 24.6 | 14 | 16.6 |
| h) Students' desire to do well in school | 3 | 4.5 | 18 | 22.6 | 53 | 47.2 | 19 | 16.6 | 8 | 9.0 |

3. General students' characteristics at school that include level of student self belonging at school, students desire to do well, teachers' expectations for student achievement, and students' desire to do well in school are described in Table 17.

On students' self-confidence and valuing mathematics and science:

**Table 17: How much do you agree with these statements about learning science?**

| | Agree a lot | | Agree a little | | Disagree a little | | Disagree a lot | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) I usually do well in science | 60 | 59.5 | 33 | 33.5 | 4 | 4.2 | 3 | 2.7 |
| b) I would like to take more science in school | 59 | 70.8 | 32 | 20.1 | 7 | 5.5 | 3 | 3.6 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| c) Science is more difficult for me than for many of my classmates | 18 | 14.5 | 31 | 32.0 | 22 | 22.3 | 29 | 31.2 |
| d) I enjoy learning science | 61 | 62.3 | 27 | 24.1 | 8 | 7.4 | 4 | 6.2 |
| e) Sometimes, when I do not initially understand a new topic in science, I know that I will never really understand it | 23 | | 25 | | 21 | | 32 | |
| f) Science is not one of my strengths | 15 | 10.5 | 30 | 21.1 | 19 | 20.3 | 37 | 48.1 |
| g) I learn things quickly in science | 46 | 41.7 | 38 | 41.4 | 11 | 12.0 | 5 | 4.9 |

**Table 18: How much do you agree with these statements about science?**

| | **Agree a lot** | | **Agree a little** | | **Disagree a little** | | **Disagree a lot** | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) I think learning science will help me in my daily life | 70 | 70.0 | 24 | 24.0 | 4 | 3.9 | 3 | 2.2 |
| b) I need science to learn other school subjects | 47 | 54.6 | 39 | 33.6 | 9 | 8.5 | 5 | 3.3 |
| c) I need to do well in science to get into the <university> of my choice | 67 | 68.1 | 21 | 21.3 | 8 | 7.3 | 3 | 3.3 |
| d) I would like a job that involved using science | 44 | | 36 | | 11 | | 8 | |
| e) I need to do well in science to get the job I want | 61 | 63.0 | 26 | 24.2 | 9 | 8.1 | 5 | 4.8 |

**Table 19: How much do you agree with these statements about learning mathematics?**

| | **Agree a lot** | | **Agree a little** | | **Disagree a little** | | **Disagree a lot** | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) I usually do well in mathematics | 47 | 46.0 | 42 | 44.5 | 6 | 6.1 | 5 | 3.3 |
| b) I would like to take more mathematics in school | 52 | 69.2 | 34 | 21.3 | 9 | 5.3 | 5 | 4.1 |
| c) Mathematics is more difficult for me than for many of my classmates | 22 | 16.5 | 31 | 31.4 | 23 | 23.4 | 23 | 28.7 |
| d) I enjoy learning mathematics | 51 | 54.6 | 30 | 28.7 | 10 | 9.0 | 9 | 7.7 |
| e) Sometimes, when I do not initially understand a new topic in mathematics, I know that I will never really understand it | 31 | | 26 | | 18 | | 26 | |
| f) Mathematics is not one of my strengths | 19 | 13.4 | 30 | 24.1 | 19 | 19.6 | 32 | 42.9 |
| g) I learn things quickly in mathematics | 36 | 34.8 | 41 | 43.8 | 13 | 14.6 | 9 | 6.7 |

**Table 20: How much do you agree with these statements about mathematics?**

| | Agree a lot | | Agree a little | | Disagree a little | | Disagree a lot | |
|---|---|---|---|---|---|---|---|---|
| | 03 | 07 | 03 | 07 | 03 | 07 | 03 | 07 |
| a) I think learning mathematics will help me in my daily life | 73 | 75.6 | 21 | 19.6 | 3 | 2.8 | 3 | 1.9 |
| b) I need mathematics to learn other school subjects | 53 | 62.6 | 36 | 28.9 | 7 | 5.5 | 4 | 2.9 |
| c) I need to do well in mathematics to get into the university of my choice | 72 | 75.0 | 18 | 16.9 | 6 | 4.8 | 3 | 3.3 |
| e) I need to do well in mathematics to get the job I want | 62 | 66.8 | 26 | 23.7 | 7 | 5.7 | 5 | 3.8 |

**Table 21: How much do you agree with these statements about your school?**

| | Agree a lot | | Agree a little | | Disagree a little | | Disagree a lot | |
|---|---|---|---|---|---|---|---|---|
| | 03 | 07 | 03 | 07 | 03 | 07 | 03 | 07 |
| a) I like being in school | 67 | 65.7 | 24 | 23.9 | 4 | 4.7 | 5 | 5.7 |
| b) I think that students in my school try to do their best | 56 | 53.7 | 31 | 33.8 | 8 | 7.7 | 5 | 4.7 |
| d) I think that teachers in my school want students to do their best | 73 | 78.4 | 17 | 13.3 | 5 | 4.4 | 5 | 4.0 |

**Table 22: In school, did any of these things happen during the last month?**

| | Yes | | No | |
|---|---|---|---|---|
| | 03 | 07 | 03 | 07 |
| a) Something of mine was stolen | 58 | 32.6 | 42 | 67.4 |
| b) I was hit or hurt by other student(s) (e.g., shoving, hitting, kicking) | 61 | 19.7 | 39 | 80.3 |
| c) I was made to do things I didn't want to do by other students | 64 | 11.1 | 36 | 88.9 |
| d) I was made fun of or called names | 61 | 13.3 | 39 | 86.7 |
| e) I was left out of activities by other students | 63 | 14.0 | 37 | 86.0 |

**Table 23: On a normal school day, how much time do you spend before or after school doing each of these things?**

| | No time | | Less than 1 hour | | 1-2 hours | | More than 2 but less than 4 hours | | 4 or more hours | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 03 | 07 | 03 | 07 | 03 | 07 | 03 | 07 | 03 | 07 |
| a) I watch television and videos | 20 | 12.2 | 28 | 21.8 | 29 | 34.4 | 13 | 16.0 | 11 | 15.7 |
| b) I play computer games | 42 | 29.8 | 29 | 33.7 | 16 | 21.2 | 6 | 7.2 | 7 | 8.0 |
| c) I play or talk with friends | 19 | 19.8 | 39 | 39.7 | 22 | 22.6 | 9 | 9.2 | 10 | 8.7 |
| d) I do jobs at home | 17 | 21.7 | 33 | 35.4 | 28 | 23.9 | 12 | 10.6 | 9 | 8.3 |
| e) I work at a paid job | 65 | 65.2 | 16 | 17.7 | 9 | 8.0 | 4 | 3.4 | 6 | 5.7 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| f) I play sports | 20 | 20.3 | 42 | 40.3 | 20 | 21.6 | 8 | 8.4 | 10 | 9.3 |
| g) I read a book for enjoyment | 30 | 36.3 | 40 | 41.0 | 20 | 15.4 | 6 | 3.9 | 4 | 3.4 |
| h) I use the internet | 67 | 56.3 | 14 | 19.2 | 9 | 12.9 | 4 | 5.2 | 6 | 6.4 |
| i) I do homework | 8 | 6.6 | 19 | 19.2 | 34 | 35.0 | 19 | 20.5 | 20 | 18.7 |

4. General parental characteristics to support learning: parental support for student achievement, parental involvement in school activities. Expectations from parental and their involvement are shown in Table 26.

| **Table 26: Does your school expect parents to do the following** | **Yes** | | **No** | |
|---|---|---|---|---|
| | **03** | **07** | **03** | **07** |
| a) Attend special events (e.g., science fair, concert, sporting events) | 86 | 96.0 | 14 | 4.0 |
| b) Raise funds for the school | 21 | 29.6 | 79 | 70.4 |
| c) Volunteer for school projects, programs, and trips | 41 | 75.8 | 59 | 24.2 |
| d) Ensure that their child completes his/her homework | 70 | 95.0 | 30 | 5.0 |
| e) Serve on school committees (e.g., select school personnel, review school finances) | 24 | 45.5 | 76 | 54.5 |

**Current curriculum and Current instructional practices**

The current curriculum is information based and is not based on clear and well-defined learning outcomes targeting special skills. Teachers rely on textbook and supplementing material are rarely existing. Its quantity and quality are described below.

From TIMSS,

- Group ability: The following table shows the percentage of student by their perception of group work in mathematics and science (Table 27):

**Table 27: Students' perception of group work**

| | **Every or almost every lessons** | | **about half the lessons** | | **Some lessons** | | **Never** | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| In science: We work in small groups on an experiment or investigation | 40 | 38.3 | 21 | 23.7 | 28 | 25.1 | 20 | 12.9 |
| In mathematics: We work together in small groups | 21 | 30.6 | 17 | 23.6 | 28 | 30.1 | 34 | 15.7 |

- Schools don't organize mathematics/science instruction for students with different levels of ability. As shown in Table 28 students study the same curriculum

| Table 28: Do you group students by ability? (percentage) | Yes | | No | |
|---|---|---|---|---|
| | 03 | 07 | 03 | 07 |
| within their mathematics classes | 12 | 9.0 | 88 | 91.0 |
| within their science classes | 15 | 8.0 | 85 | 92.0 |

- Participation in extra curricula activities: Table 29 shows the percentage of schools which offer enrichments or remedial activities in mathematics and science.

| Table 29: Does school do any of the following for students? | Yes | | No | |
|---|---|---|---|---|
| | 03 | 07 | 03 | 07 |
| a) Offer enrichment mathematics | 57 | 88.4 | 43 | 11.6 |
| b) Offer remedial mathematics | 89 | 92.9 | 11 | 7.1 |
| c) Offer enrichment science | 55 | 88.8 | 45 | 11.2 |
| d) Offer remedial science | 88 | 92.4 | 12 | 7.6 |

Tables (30) and (31) show the structure and type of instructional activities which are used in science and mathematics lessons.

**Table 30: How often do you do these things in your science lessons?**

| | Every or almost every lessons | | About half the lessons | | Some lessons | | Never | |
|---|---|---|---|---|---|---|---|---|
| | 03 | 07 | 03 | 07 | 03 | 07 | 03 | 07 |
| a) We watch the teacher demonstrate an experiment or investigation | 48 | 51.7 | 20 | 25.2 | 28 | 18.2 | 5 | 4.9 |
| c) We design or plan an experiment or investigation | 30 | 35.5 | 26 | 27.7 | 33 | 27.6 | 12 | 9.1 |
| d) We conduct an experiment or investigation | 30 | 35.2 | 25 | 26.2 | 34 | 29.4 | 12 | 9.1 |
| e) We work in small groups on an experiment or investigation | 40 | 38.3 | 21 | 23.7 | 28 | 25.1 | 20 | 12.9 |
| f) We write explanations about what was observed and why it happened | 40 | 60.2 | 26 | 21.3 | 25 | 14.1 | 10 | 4.4 |
| h) We relate what we are learning in science to our daily lives | 46 | 48.2 | 25 | 27.0 | 21 | 17.7 | 9 | 7.1 |
| j) We review our homework | 55 | 57.6 | 21 | 22.2 | 17 | 14.9 | 7 | 5.3 |
| k) We listen to the teacher give a lecture-style presentation | 69 | 67.8 | 16 | 17.7 | 11 | 9.4 | 5 | 5.2 |
| l) We work problems on our own | 54 | 51.2 | 26 | 29.8 | 16 | 15.3 | 4 | 3.7 |
| m) We begin our homework in class | 26 | 24.2 | 20 | 20.5 | 28 | 28.9 | 27 | 26.5 |
| n) We have a quiz or test | 23 | 27.0 | 19 | 23.2 | 38 | 35.3 | 21 | 14.5 |

**Table 31: How often do you do these things in your mathematics lessons?**

| | Every or almost every lesson | | About half the lessons | | Some lessons | | Never | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) We practice adding, subtracting, multiplying, and dividing without using a calculator | 50 | 57.6 | 9 | 11.4 | 18 | 19.9 | 23 | 11.1 |
| b) We work on fractions and decimals | 34 | 37.9 | 24 | 23.7 | 38 | 34.0 | 4 | 4.4 |
| c) We interpret data in tables, charts, or graphs | 39 | 39.2 | 25 | 25.9 | 31 | 29.8 | 5 | 5.1 |
| d) We write equations and functions to represent relationships | 43 | 43.0 | 27 | 27.4 | 25 | 25.7 | 4 | 3.9 |
| e) We work together in small groups | 21 | 30.6 | 17 | 23.6 | 28 | 30.1 | 34 | 15.7 |
| f) We relate what we are learning in mathematics to our daily lives | 43 | 46.1 | 21 | 24.7 | 22 | 19.3 | 14 | 9.9 |
| g) We explain our answers | 64 | 64.1 | 19 | 20.2 | 14 | 12.8 | 4 | 3.0 |
| h) We decide on our own procedures for solving complex problems | 56 | 40.7 | 22 | 29.2 | 17 | 22.1 | 5 | 8.0 |
| i) We review our homework | 62 | 62.0 | 19 | 19.8 | 13 | 13.8 | 6 | 4.4 |
| j) We listen to the teacher give a lecture-style presentation | 70 | 73.4 | 15 | 14.6 | 10 | 8.7 | 5 | 3.3 |
| k) We work problems on our own | 55 | 52.9 | 25 | 29.2 | 16 | 14.7 | 4 | 3.2 |
| l) We begin our homework in class | 28 | 23.8 | 19 | 19.5 | 28 | 31.3 | 25 | 25.4 |
| m) We have a quiz or test | 22 | 26.2 | 17 | 23.0 | 40 | 38.9 | 21 | 11.9 |
| n) We use calculators | 12 | 14.9 | 8 | 14.1 | 26 | 35.2 | 55 | 35.7 |

On homework, Tables 32-35 show the type, frequency, and expected effort for mathematics and science:

**Table 32: How often does your teacher give you homework in mathematics?**

| | **03** | **07** |
|---|---|---|
| Every day | 54 | 52.7 |
| 3 or 4 times a week | 29 | 31.3 |
| 1 or 2 times a week | 10 | 11.5 |
| Less than once a week | 5 | 3.6 |
| Never | 2 | 0.9 |

**When your teacher gives you mathematics homework, about how many minutes are you usually given?**

| | 03 | 07 |
|---|---|---|
| Fewer than 15 minutes | 27 | 36.3 |
| 15–30 minutes | 43 | 32.8 |
| 31–60 minutes | 20 | 18.2 |
| 61–90 minutes | 5 | 5.2 |
| More than 90 minutes- | 7 | 7.5 |

**How often does your teacher give you homework in science?**

| | 03 | 07 |
|---|---|---|
| Every day | 23 | 32.1 |
| 3 or 4 times a week | 31 | 37.9 |
| 1 or 2 times a week | 31 | 21.3 |
| Less than once a week | 13 | 6.7 |
| Never | 2 | 1.9 |

**When your teacher gives you science homework, about how many minutes are you usually given?**

| | 03 | 07 |
|---|---|---|
| Fewer than 15 minutes | 24 | 34.4 |
| 15–30 minutes | 39 | 35.2 |
| 31–60 minutes | 24 | 18.7 |
| 61–90 minutes | 8 | 5.9 |
| More than 90 minutes | 6 | 5.8 |

Frequency of homework:

| **Table 33: How often do you assign the following kinds of science homework to the <TIMSS class>?** | **Always or almost always** | | **Sometimes** | | **Never or almost never** | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Doing problem/question sets | 57 | 66.8 | 42 | 31.6 | 1 | 1.6 |
| b) Finding one or more applications of the content covered | 28 | 42.0 | 64 | 52.5 | 8 | 5.5 |
| c) Reading from a textbook or supplementary materials | 45 | 40.1 | 46 | 50.3 | 9 | 9.6 |
| d) Writing definitions or other short writing assignments | 36 | 48.1 | 56 | 35.4 | 7 | 16.4 |
| e) Working on projects | 4 | 14.4 | 62 | 47.3 | 34 | 38.3 |
| f) Working on small investigations or gathering data | 20 | 29.6 | 65 | 55.0 | 16 | 15.3 |
| g) Preparing reports | 22 | 31.7 | 61 | 57.1 | 17 | 11.1 |

**Table 34: How often do you assign the following kinds of mathematics homework to the TIMSS class?**

| | Always or almost always | | Sometimes | | Never or almost never | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Doing problem/question sets | 81 | 75.3 | 17 | 22.2 | 2 | 2.6 |
| b) Gathering data and reporting | 2 | 11.2 | 68 | 52.4 | 30 | 36.4 |
| c) Finding one or more applications of the content covered | 10 | 34.7 | 74 | 48.9 | 16 | 16.3 |

**Table 35: How often do you do the following with the mathematics homework assignments?**

| | Always or almost always | | Sometimes | | Never or almost never | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Monitor whether or not the homework was completed | 83 | 86.7 | 17 | 12.8 | 0 | 0.5 |
| b) Correct assignments and then give feedback to students - | 72 | 70.9 | 28 | 27.6 | 0 | 1.5 |
| c) Have students correct their own homework in class | 68 | 20.8 | 24 | 41.6 | 8 | 37.6 |
| d) Use the homework as a basis for class discussion | 53 | 66.8 | 46 | 32.1 | 2 | 1.0 |
| e) Use the homework to contribute towards students' grades or marks | 30 | 39.3 | 66 | 49.0 | 4 | 11.7 |

**Table 36: How often do you do the following with the science homework assignments?**

| | Always or almost always | | Sometimes | | Never or almost never | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Monitor whether or not the homework was completed - | 89 | 91.7 | 12 | 7.8 | 0 | 0.5 |
| b) Correct assignments and then give feedback to students | 81 | 75.0 | 19 | 24.0 | 0 | 1.0 |
| c) Have students correct their own homework in class | 56 | 24.6 | 30 | 45.0 | 14 | 30.4 |
| d) Use the homework as a basis for class discussion | 41 | 49.0 | 56 | 47.9 | 4 | 3.1 |
| e) Use the homework to contribute towards students' grades or marks | 38 | 40.1 | 52 | 46.9 | 9 | 13.0 |

Problems facing teaching in relation to their classroom activities and instructions are solicited in Tables 37 and 38, for science and mathematics classes respectively:

**Table 37: In your view, to what extent do the following limit how you teach science**

| | Not applicable | | Not at all | | A little | | Some | | A lot | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Students with different academic abilities | 2 | 1.0 | 4 | 12.0 | 18 | 25.0 | 29 | 31.5 | 48 | 30.5 |
| b) Students who come from a wide range of backgrounds (e.g., economic, language) | 18 | 7.0 | 9 | 22.1 | 28 | 31.7 | 36 | 29.1 | 11 | 10.1 |
| c) Students with special needs (e.g., hearing, vision, speech impairment, physical disabilities, mental or emotional/psychological impairment) | 33 | 26.5 | 18 | 14.5 | 17 | 31.0 | 27 | 20.5 | 5 | 7.5 |
| d) Uninterested students | 5 | 3.5 | 2 | 6.0 | 16 | 31.2 | 29 | 21.6 | 48 | 37.7 |
| f) Disruptive students Resources | 16 | 6.5 | 12 | 8.5 | 24 | 35.7 | 37 | 30.2 | 12 | 19.1 |
| g) Shortage of computer hardware | 32 | 19.0 | 15 | 25.5 | 12 | 19.5 | 19 | 19.0 | 22 | 17.0 |
| h) Shortage of computer software | 26 | 16.5 | 13 | 17.5 | 10 | 26.5 | 19 | 21.0 | 33 | 18.5 |
| i) Shortage of support for using computers | 26 | 20.7 | 14 | 28.3 | 11 | 22.2 | 17 | 17.7 | 32 | 11.1 |
| j) Shortage of textbooks for student use | 50 | 48.5 | 23 | 32.0 | 15 | 11.0 | 7 | 3.0 | 4 | 5.5 |
| k) Shortage of other instructional equipment for students' use | 15 | 14.6 | 9 | 24.1 | 31 | 34.7 | 32 | 18.6 | 13 | 8.0 |
| l) Shortage of equipment for your use in demonstrations and other exercises | 12 | 11.0 | 11 | 22.0 | 26 | 39.5 | 37 | 21.5 | 13 | 6.0 |
| m) Inadequate physical facilities | 12 | 10.1 | 9 | 21.1 | 22 | 32.2 | 37 | 23.1 | 20 | 13.6 |
| n) High student/teacher ratio | 16 | 7.5 | 7 | 18.0 | 14 | 18.0 | 24 | 25.0 | 36 | 31.5 |

**Table 38: In your view, to what extent do the following limit how you teach mathematics?**

| | Not applicable | | Not at all | | A little | | Some | | Alot | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Students** | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Students with different academic abilities | 1 | 3.6 | 2 | 12.7 | 19 | 27.9 | 40 | 28.9 | | 26.9 |
| b) Students who come from a wide range of backgrounds (e.g., economic, language) | 16 | 13.7 | 13 | 23.9 | 27 | 29.9 | 33 | 24.9 | | 7.6 |
| c) Students with special needs, (e.g., hearing, vision, speech impairment, physical disabilities, mental or emotional/psychological impairment) | 29 | 30.6 | 8 | 15.3 | 33 | 29.1 | 21 | 15.3 | | 9.7 |
| d) Uninterested students | 3 | 2.0 | 2 | 7.1 | 16 | 27.6 | 33 | 28.6 | | 34.7 |
| e) Low morale among students | | | | | | | | | | |
| f) Disruptive students | 11 | 7.7 | 18 | 6.7 | 27 | 34.9 | 32 | 33.8 | | 16.9 |
| **Resources** | | | | | | | | | | |
| g) Shortage of computer hardware | 34 | 18.5 | 13 | 21.0 | 17 | 16.4 | 13 | 21.5 | | 22.9 |
| h) Shortage of computer software - | 32 | 16.8 | 8 | 22.4 | 16 | 20.4 | 10 | 22.4 | | 17.9 |
| i) Shortage of support for using computers | 26 | 23.8 | 8 | 26.9 | 17 | 18.1 | 16 | 19.7 | | 11.4 |
| j) Shortage of textbooks for student use | 46 | 56.1 | 30 | 28.6 | 9 | 6.1 | 10 | 5.6 | | 3.6 |
| k) Shortage of other instructional equipment for students' use | 9 | 16.4 | 9 | 27.2 | 35 | 32.3 | 35 | 17.9 | | 6.2 |
| l) Shortage of equipment for your use in demonstrations and other exercises | 13 | 12.2 | 12 | 20.9 | 32 | 35.7 | 33 | 22.4 | | 8.7 |
| m) Inadequate physical facilities | 15 | 10.4 | 17 | 25.0 | 22 | 28.6 | 24 | 25.0 | | 10.9 |
| n) High student/teacher ratio | 11 | 11.3 | 12 | 14.4 | 21 | 17.4 | 17 | 26.2 | | 30.8 |

Time on task and coverage of content is described in Tables 39 and 40 :

**Table 39: By the end of this school year, approximately what percentage of teaching time will you have spent during this school year on each of the following science content areas**

| | % | |
|---|---|---|
| | **03** | **07** |
| a) Life science (e.g., types, characteristics, and classification of living things; structure/function and life processes in organisms; reproduction and heredity; diversity, adaptation and natural selection; ecosystems; and human health) | 25 | 21.8 |
| b) Chemistry (e.g., classification, composition and particulate structure of matter; properties and uses of water; acids and bases; and chemical change) | 24 | 25.9 |
| c) Physics (e.g., physical states and changes in matter; energy types, sources and conversions; heat and temperature; light; sound and vibration; electricity and magnetism; forces and motion) | 25 | 30.2 |
| d) Earth science (e.g., Earth's structure and physical features; Earth's processes, cycles and history; the solar system and universe) | 15 | 16.8 |
| e) Environmental science (e.g., changes in population; use and conservation of natural resources; and changes in environments) | 9 | |
| f) Other | 2 | 5.2 |

**Table 40: By the end of this school year, approximately what percentage of teaching time will you have spent during this school year on each of the following mathematics content areas?**

| | **03** | **07** |
|---|---|---|
| a) Number (e.g., whole numbers, fractions, decimals, ratio, proportion, percent) | 25 | 25.6 |
| b) Geometry (e.g., lines and angles, shapes, congruence and similarity, spatial relationships, symmetry and transformations) | 21 | 22.6 |
| c) Algebra (e.g., patterns, equations and formulas, relationships) | 22 | 26.7 |
| d) Data (e.g., data collection and organization, data representation, data interpretation, probability) | 13 | 15.9 |
| f) Other | 5 | 9.3 |

Teacher's perception on content of the science and mathematics curricula is shown in tables 41 and 42:

**Table 41: Teacher's feedback about the science curriculum**

| **A. Biology** | **Mostly taught before this year** | | **Mostly taught this year** | | **Not Yet taught or just introduced** | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Classification of organisms on the basis of a variety of physical and behavioral characteristics | 16 | 45.7 | 82 | 37.2 | 3 | 17.1 |
| b) The major organ systems in humans and other organisms | 44 | 57.3 | 48 | 17.6 | 8 | 25.1 |
| c) How the systems function to maintain stable bodily conditions | 31 | 46.7 | 46 | 17.3 | 23 | 36.0 |
| d) Cell structures and functions | 54 | 52.0 | 26 | 22.7 | 20 | 25.3 |
| e) Photosynthesis and respiration as processes of cells and organisms, including substances used and produced | 36 | 47.2 | 54 | 39.6 | 10 | 13.2 |
| f) Life cycles of organisms, including humans, plants, birds, insects | 54 | 52.8 | 20 | 24.1 | 26 | 23.1 |
| g) Reproduction (sexual and asexual), and heredity (passing on of traits), inherited versus acquired/learned characteristics | 42 | 25.4 | 14 | 64.5 | 45 | 10.2 |
| h) The role of variation and adaptation in survival/extinction of species in a changing environment | 44 | 23.2 | 12 | 64.1 | 44 | 12.6 |
| i) The interaction of living organisms in an ecosystem (energy flow, food chains and food webs, food pyramids, and the effects of change upon the system) | 53 | 24.7 | 25 | 71.6 | 22 | 3.6 |
| j) Cycling of materials in nature (water, carbon/oxygen cycle, decomposition of organisms) | 56 | 26.2 | 17 | 68.2 | 27 | 5.6 |
| k) Causes of common infectious diseases, methods of infection/transmission, prevention, and the body's natural resistance and healing capabilities | 36 | 36.4 | 10 | 11.6 | 54 | 52.0 |
| l) Preventive medicine methods (diet, hygiene, exercise and lifestyle) | 47 | 35.0 | 11 | 14.0 | 42 | 51.0 |
| **B. Chemistry** | | | | | | |
| a) Classification and composition of matter (physical and chemical characteristics, pure substances and mixtures, separation techniques) | 39 | 49.7 | 52 | 41.7 | 9 | 8.5 |
| b) Properties of solutions (solvents, solutes, effects of temperature on solubility) | 58 | 54.0 | 22 | 22.5 | 20 | 23.5 |
| c) Particulate structure of matter (molecules, atoms, protons, neutrons, and electrons) | 20 | 18.5 | 78 | 79.5 | 2 | 2.0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| d) Properties and uses of water (composition, melting/boiling points, changes in density/volume) | 62 | 60.5 | 19 | 17.0 | 19 | 22.5 |
| e) The properties and uses of common acids and bases | 23 | 26.9 | 38 | 42.6 | 40 | 30.5 |
| f) Chemical change (transformation of reactants, evidence of chemical change, conservation of matter) | 25 | 37.7 | 46 | 43.2 | 29 | 19.1 |
| g) The need for oxygen in common oxidation reactions (combustion, rusting) and the relative tendency of familiar substances to undergo these reactions | 17 | 19.6 | 75 | 75.9 | 9 | 4.5 |
| h) Classification of familiar chemical transformations as releasing or absorbing heat/energy | 17 | 15.5 | 23 | 19.0 | 63 | 65.5 |
| **C. Physics** | | | | | | |
| a) Physical states and changes in matter (explanations of properties including volume, shape, density and compressibility in terms of movement/distance between particles) | 59 | 53.8 | 29 | 24.6 | 12 | 21.6 |
| b) The processes of melting, freezing, evaporation, and condensation(phase change by supplying/removing heat; melting/boiling points; effects of pressure and purity of substances) | 62 | 67.5 | 23 | 16.0 | 16 | 16.5 |
| c) Energy types, sources, and conversions, including heat transfer | 17 | 48.7 | 67 | 22.6 | 16 | 28.6 |
| d) Thermal expansion and changes in volume and/or pressure | 35 | 37.2 | 27 | 19.9 | 39 | 42.9 |
| e) Basic properties/behavior of light (reflection, refraction, light and color, simple ray diagrams) | 7 | 14.1 | 86 | 84.4 | 7 | 1.5 |
| f) Properties of sound (production by vibration, transmission through media, ways of describing sound (intensity, pitch), relative speed) | 4 | 11.0 | 94 | 88.0 | 2 | 1.0 |
| g) Electric circuits (flow of current, types of circuits – open/closed, parallel/series) and relationship between voltage and current | 9 | 6.5 | 88 | 89.4 | 3 | 4.0 |
| h) Properties of permanent magnets and electromagnets | 69 | 58.4 | 23 | 18.8 | 8 | 22.8 |
| i) Forces and motion (types of forces, basic description of motion), use of distance/time graphs | 8 | 16.5 | 83 | 79.5 | 9 | 4.0 |
| j) Effects of density and pressure | 42 | 53.5 | 26 | 17.0 | 32 | 29.5 |
| **D. Earth Science** | | | | | | |
| a) Earth's structure and physical features (Earth's crust, mantle, and core; topographic maps) | 32 | 27.3 | 53 | 62.1 | 16 | 10.6 |
| b) The physical state, movement, composition, and relative distribution of water on the Earth | 27 | 36.0 | 28 | 29.4 | 45 | 34.5 |
| c) The Earth's atmosphere and the relative abundance of its main components | 25 | 37.9 | 12 | 43.9 | 63 | 18.2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| d) Earth's water cycle (steps, role of sun's energy, circulation/renewal of fresh water) | 66 | 49.2 | 21 | 30.3 | 22 | 20.5 |
| e) Processes in the rock cycle and the formation of igneous, metamorphic, and sedimentary rock | 55 | 52.8 | 18 | 25.9 | 28 | 21.3 |
| f) Weather data/maps, and changes in weather patterns(e.g., seasonal changes, effects of latitude, altitude and geography) | 36 | 29.0 | 5 | 10.5 | 59 | 60.5 |
| g) Geological processes occurring over billions of years (e.g., erosion, mountain building, plate movement) | 27 | 23.0 | 29 | 63.8 | 44 | 13.3 |
| h) Formation of fossils and fossil fuels | 35 | 34.3 | 59 | 60.1 | 6 | 5.6 |
| i) Explanation of phenomena on Earth based on position/movement of bodies in the solar system and universe (e.g., day/night, tides, year, phases of the moon, eclipses, seasons, appearance of sun, moon, planets, and constellations) | 57 | 45.5 | 13 | 14.5 | 31 | 40.0 |

**Table 42: Teacher's feedback about the Mathematics curriculum**

| **A. Number** | **Mostly taught before this year** | | **Mostly taught this year** | | **Not yet taught or Just introduced** | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Whole numbers including place value, factorization, and the four operations | 76 | 77.5 | 24 | 21.5 | 0 | 1.0 |
| b) Computations, estimations, or approximations involving whole numbers | 81 | 73.0 | 18 | 26.0 | 1 | 1.0 |
| c) Common fractions including equivalent fractions, and ordering of fractions | 78 | 76.0 | 20 | 23.0 | 1 | 1.0 |
| d) Decimal fractions including place value, ordering, rounding, and converting to common fractions (and vice versa) | 64 | 75.6 | 35 | 22.8 | 1 | 1.5 |
| e) Representing decimals and fractions using words, numbers, or models (including number lines) | 71 | 70.9 | 29 | 26.6 | 0 | 2.5 |
| f) Computations with fractions | 77 | 71.9 | 22 | 26.6 | 0 | 1.5 |
| g) Computations with decimals | 75 | 70.6 | 24 | 27.9 | 1 | 1.5 |
| h) Integers including words, numbers, or models (including number lines), ordering integers, addition, subtraction, multiplication, and division with integers | 71 | 67.5 | 29 | 30.0 | 1 | 2.5 |
| i) Ratios (equivalence, division of a quantity by a given ratio) | 68 | 64.3 | 32 | 32.2 | 0 | 3.5 |
| j) Conversion of percents to fractions or decimals, and vice versa | 61 | 67.5 | 38 | 29.5 | 1 | 3.0 |

**B. Algebra**

| | | | | | | |
|---|---|---|---|---|---|---|
| a) Numeric, algebraic, and geometric patterns or sequences (extension, missing terms, generalization of patterns) | 10 | 10.1 | 42 | 86.4 | 49 | 3.5 |
| b) Sums, products, and powers of expressions containing variables | 22 | 12.6 | 77 | 84.9 | 1 | 2.5 |
| c) Simple linear equations and inequalities, and simultaneous (two variables) equations | 9 | 7.0 | 87 | 87.9 | 34 | 5.0 |
| d) Equivalent representations of functions as ordered pairs, tables, graphs, words, or equations | 7 | 9.5 | 91 | 87.4 | 1 | 3.0 |

**D. Geometry**

| | | | | | | |
|---|---|---|---|---|---|---|
| a) Angles - acute, right, straight, obtuse, reflex, complementary, and supplementary | 82 | 77.5 | 19 | 20.0 | 0 | 2.5 |
| b) Relationships for angles at a point, angles on a line, vertically opposite angles, angles associated with a transversal cutting parallel lines, and perpendicularity | 77 | 70.2 | 20 | 27.3 | 3 | 2.5 |
| d) Properties of geometric shapes: triangles and quadrilaterals | 40 | 60.2 | 60 | 37.2 | 0 | 2.6 |
| f) Construct or draw triangles and rectangles of given dimensions | 79 | 50.5 | 19 | 46.0 | 2 | 3.5 |
| g) Pythagorean theorem (not proof) to find length of a side | 10 | 10.6 | 88 | 88.4 | 2 | 1.0 |
| h) Congruent figures (triangles, quadrilaterals) and their corresponding measures | 47 | 64.0 | 53 | 30.5 | 0 | 5.6 |
| i) Similar triangles and recall their properties | 64 | 62.6 | 35 | 26.7 | 1 | 10.8 |
| l) Line and rotational symmetry for two-dimensional shapes | 7 | 10.6 | 9 | 29.1 | 84 | 60.3 |
| m) Translation, reflection, rotation, and enlargement | 5 | 10.7 | 10 | 20.3 | 85 | 69.0 |

**E. Data**

| | | | | | | |
|---|---|---|---|---|---|---|
| a) Organizing a set of data by one or more characteristics using a tally chart, table, or graph | 38 | 59.8 | 22 | 21.6 | 40 | 18.6 |
| e) Characteristics of data sets including mean, median, range, and shape of distribution (in general terms) | 30 | 40.7 | 12 | 20.6 | 58 | 38.7 |
| f) Interpreting data sets (e.g., draw conclusions, make predictions, and estimate values between and beyond given data points) | 16 | 27.4 | 14 | 22.8 | 70 | 49.7 |

The following Table shows baseline information of high importance to on the level of belief of a math teacher. It contains the percentage of teachers by the level of agreement to a set of teaching strategies in mathematics such as:

- More than one representation (picture, concrete material, symbols, …)

- Solving mathematics problems often involves hypothesizing, estimating, testing, and modifying findings
- Learning mathematics/science mainly involves memorizing
- There are different ways to solve most mathematical problems
- Few new discoveries in science/mathematics are being made
- Modeling real-world problems is essential to teaching science/mathematics

**Examinations**

Tables 43-46 show the frequency and type of examinations used to evaluate student performance in mathematics and science.

**Table 43: How often do you give a science test or examination?**

| | **03** | **07** |
|---|---|---|
| About once a week | 2 | 24.9 |
| About every two weeks | 26 | 37.1 |
| About once a month | 53 | 35.5 |
| A few times a year | 19 | 2.5 |
| Never | 0 | 0 |

**What item formats do you typically use in your science tests or examinations?**

| | **03** | **07** |
|---|---|---|
| Only constructed-response | 3 | 1.0 |
| Mostly constructed-response | 29 | 7.6 |
| About half constructed-response and half objective (e.g., multiple-choice) | 65 | 82.3 |
| Mostly objective | 3 | 8.1 |
| Only objective | 0 | 1.0 |

**Table 44: How often do you include the following types of questions in your science tests or examinations?**

| | **Never or almost never** | | **Sometimes** | | **Always or almost always** | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| b) Questions involving hypotheses and conclusions | 15 | 20.3 | 75 | 52.6 | 10 | 27.1 |
| c) Questions based on recall of facts or procedures | 50 | 63.5 | 44 | 33.9 | 6 | 2.6 |

On Mathematics:

**Table 45: How often do you give a mathematics test or examination?**

| | % of teachers | |
|---|---|---|
| | **03** | **07** |
| About once a week | 4 | 29.0 |
| About every two weeks | 21 | 34.5 |
| About once a month | 75 | 31.5 |
| A few times a year | 0 | 4.5 |
| Never | 0 | 0.5 |

**What item formats do you typically use in your mathematics tests or examinations?**

| | % of teachers | |
|---|---|---|
| | **03** | **07** |
| Only constructed-response | 9 | 3.0 |
| Mostly constructed-response | 27 | 18.7 |
| About half constructed-response and half objective (e.g., multiple-choice) | 60 | 73.2 |
| Mostly objective | 5 | 5.1 |
| Only objective | 0 | 0 |

**Table 46: How often do you include the following types of questions in your mathematics tests or examinations?**

| | **Always or almost always** | | **Sometimes** | | **Never or almost never** | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Questions involving application of mathematical procedures | 89 | 88.4 | 11 | 11.1 | 0 | 0.5 |
| b) Questions involving searching for patterns and relationships | 22 | 27.9 | 74 | 68.5 | 4 | 3.6 |
| c) Questions requiring explanations or justifications | 17 | 19.8 | 70 | 59.5 | 14 | 20.3 |

**Current process for certification and evaluation of teachers**

The following two tables show the readiness levels of teachers to teach across the mathematics and science content areas.

**Table : Science teacher's perception of readiness to teach the following topics**

| A. Biology | Not Applicable | | Very well prepared | | Somwhat prepared | | Not well prepared | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Major organs and organ systems in humans and other organisms (structure/function, life processes that maintain stable bodily conditions) | 50 | 1.0 | 46 | 68.0 | 4 | 28.5 | | 2.5 |
| b) Cells and their functions, including respiration and photosynthesis as cellular processes | 50 | 0.5 | 46 | 72.4 | 3 | 23.1 | | 4.0 |
| c) Reproduction (sexual and asexual) and heredity (passing on of traits, inherited versus acquired/learned characteristics) | 40 | 1.5 | 55 | 69.5 | 5 | 24.4 | | 4.6 |
| d) Role of variation and adaptation in survival/extinction of species in a changing environment - | 46 | 2.1 | 50 | 62.1 | 5 | 30.3 | | 5.6 |
| e) Interaction of living organisms and the physical environment in an ecosystem (energy flow, food webs, effect of changes , cycling of materials) | 50 | 0.5 | 47 | 77.4 | 3 | 19.6 | | 2.5 |
| **B. Chemistry** | | | | | | | | |
| a) Classification and composition of matter (characteristics of elements, compounds, mixtures) | 67 | 2.0 | 31 | 79.8 | 2 | 16.7 | | 1.5 |
| b) Particulate structure of matter (molecules, atoms, protons, neutrons, and electrons) | 75 | 2.0 | 25 | 88.5 | 0 | 9.5 | | 0 |
| c) Properties of solutions (solvent, solute, concentration/dilution, effect of temperature on solubility) | 63 | 1.5 | 25 | 68.8 | 1 | 26.6 | | 3.0 |
| d) Properties and uses of common acids and bases - | 51 | 1.5 | 45 | 60.3 | 4 | 33.7 | | 4.5 |
| e) Chemical change (transformation of reactants, evidence of chemical change, conservation of matter, common oxidation reactions - combustion and rusting) - | 55 | 1.0 | 43 | 77.0 | 2 | 19.5 | | 2.5 |
| **C. Physics** | | | | | | | | |
| a) Physical states and changes in matter (explanations of properties in terms of movement/distance between particles; phase change by supplying/removing heat/energy, thermal expansion and changes in volume and/or pressure) | 52 | 1.5 | 45 | 76.6 | 4 | 20.3 | | 1.5 |
| b) Energy types, sources, and conversions, including heat transfer | 52 | 2.0 | 44 | 78.8 | 4 | 17.7 | | 1.5 |
| c) Basic properties/behaviors of light (reflection, refraction, light and color, simple ray diagrams) and sound (production by vibration, transmission through media, relative speed of light and sound) | 44 | 2.0 | 51 | 67.0 | 5 | 27.5 | | 3.5 |
| d) Electric circuits (flow of current; types of circuits - opened/closed and parallel/series; current/voltage relationship) | 58 | 2.0 | 36 | 67.0 | 7 | 28.0 | | 3.0 |
| e) Forces and motion (types of forces, basic description of motion, use of distance/time graphs, effects of density and pressure | 45 | 3.5 | 49 | 65.5 | 6 | 26.0 | | 5.0 |

**D. Earth Science**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| a) Earth's structure and physical features (Earth's crust, mantle and core; use of topographic maps) | 40 | 2.5 | 52 | 51.5 | 8 | 41.0 | 0 |
| b) Earth's processes, cycles and history (rock cycle; water cycle; weather patterns; major geological events; formation of fossils and fossil fuels) | 37 | 2.5 | 56 | 57.6 | 7 | 33.8 | 6.1 |
| c) Earth in the solar system and the universe (phenomena on Earth - day/night, tides, phases of moon, eclipses, seasons of Earth compared to other bodies; the sun as a star) | 48 | 3.0 | 43 | 57.5 | 9 | 35.0 | 4.5 |

The following tables are based on TIMSS and show the baseline and follow up data on the following:

Areas of major for math and science teachers are shown in the following Table:

**During your <post-secondary> education, what was your major or main area(s) of study? (Math)**

| | Yes | | No | |
|---|---|---|---|---|
| | **03** | **07** | **03** | **07** |
| a) Mathematics | 76 | 87.5 | 24 | 12.5 |
| b) Mathematics Education | 23 | 41.5 | 78 | 58.5 |
| c) Science | 5 | 32.0 | 95 | 68.0 |
| d) Education – Science | 0 | 3.0 | 100 | 97.0 |
| e) Education – General | 0 | 19.5 | 100 | 80.5 |
| f) Other | 8 | 15.6 | 92 | 84.4 |

**During your <post-secondary> education, what was your major or main area(s) of study? (science)**

| | Yes | | No | |
|---|---|---|---|---|
| | **03** | **07** | **03** | **07** |
| a) Biology | 15 | 52.3 | 85 | 47.7 |
| b) Physics | 18 | 63.5 | 82 | 36.5 |
| c) Chemistry | 25 | 60.5 | 75 | 39.5 |
| d) Earth Science | 5 | 37.2 | 95 | 62.8 |
| e) Education - Science | 33 | 37.0 | 67 | 63.0 |
| f) Mathematics | 0 | 49.5 | 100 | 50.5 |
| g) Education – Mathematics | 0 | 5.6 | 100 | 94.4 |
| h) Education – General | 0 | 20.6 | 100 | 79.4 |
| i) Other | 10 | 16.8 | 90 | 83.2 |

Requirements to satisfy in order to become math teachers

- Obtained BA plus teaching diploma for basic cycle and BA plus high diploma for secondary level. Tables in first section of the report show the percentage of teachers by qualification.

Frequency of use of the following types of interactions with other teachers:

- Discussions about how to teach a particular concept
- Working on preparing instructional materials
- Visits to another teacher's classroom to observe his/her teaching
- Informal observations of class room by another teacher

**How often do you have the following types of interactions with other teachers?**

| Math teachers | Never or almost never | | 2 or 3 times per month | | 1-3 times per week | | Daily or almost daily | |
|---|---|---|---|---|---|---|---|---|
| | 03 | 07 | 03 | 07 | 03 | 07 | 03 | 07 |
| a) Discussions about how to teach a particular concept | 9 | 10.1 | 39 | 43.7 | 34 | 35.2 | 18 | 11.1 |
| b) Working on preparing instructional materials | 20 | 21.1 | 45 | 42.7 | 18 | 27.6 | 17 | 8.5 |
| c) Visits to another teacher's classroom to observe his/her teaching | 31 | 29.5 | 57 | 53.0 | 11 | 15.0 | 1 | 2.5 |
| d) Informal observations of my classroom by another teacher - | 56 | 42.2 | 34 | 26.1 | 7 | 17.1 | 3 | 14.6 |

**How often do you have the following types of interactions with other teachers?**

| Science teachers | Never or almost never | | 2 or 3 times per month | | 1-3 times per week | | Daily or almost daily | |
|---|---|---|---|---|---|---|---|---|
| | 03 | 07 | 03 | 07 | 03 | 07 | 03 | 07 |
| a) Discussions about how to teach a particular concept | 5 | 9.5 | 31 | 38.0 | 41 | 38.5 | 22 | 14.0 |
| b) Working on preparing instructional materials | 5 | 11.0 | 45 | 29.5 | 26 | 33.5 | 25 | 26.0 |
| c) Visits to another teacher's classroom to observe his/her teaching | 34 | 31.5 | 63 | 54.0 | 2 | 12.0 | 1 | 2.5 |
| d) Informal observations of my classroom by another teacher - | 53 | 38.9 | 40 | 39.9 | 5 | 14.1 | 2 | 7.1 |

As shown the percentages on the method by which teachers and their practices are assessed:

- observations by the principal or senior staff
- observations by inspectors or other persons external to school
- student achievement
- Teacher peer review

**Methods used to evaluate the practice of mathematics teachers?**

| | 03 | 07 |
|---|---|---|
| a) Observations by the principal or senior staff | 98% | 98% |
| b) Observations by inspectors or other persons external to the school | 96% | 98% |
| c) Student achievement | 86% | 91% |
| d) Teacher peer review | 83% | 83% |

**Methods used to evaluate the practice of science teachers?**

| | Yes | | No | |
|---|---|---|---|---|
| | **03** | **07** | **03** | **07** |
| a) Observations by the principal or senior staff | 97 | 99.5 | 3 | 0.5 |
| b) Observations by inspectors or other persons external to the school | 95 | 98.5 | 5 | 1.5 |
| c) Student achievement | 86 | 89.4 | 14 | 10.6 |
| d) Teacher peer review | 78 | 82.4 | 22 | 17.6 |

**Level of training and teacher development functions**

From TIMSS, we find:

1. Teachers involvement in professional developmental opportunities:
    a. Supporting the implementation of the national or regional curriculum
    b. Designing or supporting the school's own improvement goals
    c. Improving content knowledge
    d. Improving teacher skills
    e. Using information and communication technology for educational purposes

**During this school year, how often have teachers been involved in professional development opportunities for mathematics and science targeted at the following?**

| | **Never** | | **1 to 2 times (255 or fewer)** | | **3 to 5 times (26%-50%)** | | **6 to 10 times (51%-75%)** | | **More than 10 times (76%-100%)** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| a) Supporting the implementation of the national or regional curriculum | 21 | 8.3 | 41 | 14.5 | 22 | 20.7 | 11 | 34.7 | 6 | 21.8 |
| b) Designing or supporting the school's own improvement goals | 20 | 4.7 | 45 | 12.5 | 20 | 22.9 | 12 | 38.5 | 4 | 21.4 |
| c) Improving content knowledge | 10 | 6.8 | 40 | 12.5 | 32 | 20.3 | 12 | 42.2 | 6 | 18.2 |
| d) Improving teaching skills - | 13 | 3.1 | 41 | 7.8 | 25 | 22.9 | 16 | 42.7 | 5 | 23.4 |
| e) Using information and communication technology for educational purposes | 42 | 3.1 | 31 | 8.8 | 14 | 15.5 | 6 | 39.2 | 8 | 33.5 |

2. Participation in professional development in the following areas:
    i. Mathematics content
    ii. Mathematics pedagogy/instruction
    iii. Mathematics curriculum
    iv. Integrating information technology in mathematics
    v. Improving student's critical thinking or problem solving skills
    vi. Mathematics assessment

| **In the past two years, have you participated in professional development in any of the following?** | **Yes** | | **No** | |
|---|---|---|---|---|
| | **03** | **07** | **03** | **07** |
| a) Mathematics content - | 46 | 58.3 | 54 | 41.7 |
| b) Mathematics pedagogy/instruction | 70 | 78.3 | 30 | 21.7 |
| c) Mathematics curriculum | 46 | 64.1 | 54 | 35.9 |
| d) Integrating information technology into mathematics | 34 | 70.2 | 66 | 29.8 |
| e) Improving students' critical thinking or problem solving skills | 57 | | 43 | |
| f) Mathematics assessment | 45 | | 55 | |

| **In the past two years, have you participated in professional development in any of the following?** | **Yes** | | **No** | |
|---|---|---|---|---|
| | **03** | **07** | **03** | **07** |
| a) Science content | 48 | 57.3 | 52 | 42.7 |
| b) Science pedagogy/instruction | 70 | 78.6 | 30 | 21.4 |
| c) Science curriculum | 42 | 68.4 | 58 | 31.6 |
| d) Integrating information technology into science | 35 | 60.5 | 65 | 39.5 |
| e) Improving students' critical thinking or inquiry skills | 57 | 74.0 | 43 | 26.0 |
| f) Science assessment | 49 | 57.2 | 51 | 42.8 |

**1. Teachers frequent use of ICT in teaching by practice**

| | CADER intervention group | Matched teachers | Z-value |
|---|---|---|---|
| Browse the Internet to search for information | 25.9 | 5.2 | 4.04* |
| Educational games | 22.4 | 3.4 | 2.20* |
| Word processing software | 31.0 | 5.2 | 2.36* |
| use email | 8.6 | 3.4 | 2.75* |
| Networking with others using the Internet | 10.3 | 3.4 | 4.67* |
| content-Use of e-content | 19.0 | 1.7 | 2.36* |
| Use of educational software | 17.2 | 0.0 | 3.13* |
| .g.e)Presenting information (Powerpoint | 34.5 | 6.9 | 2.33* |
| Use of spreadsheets | 15.5 | 3.4 | 4.69* |

**2. Use of modern teaching approaches**

| | CADER intervention group | Matched teachers | Z-value |
|---|---|---|---|
| teacher introduces new topics by submitting an examination of problem / status / resolution of phenomenon and calls | 78 | 81 | 0.45 |
| Teacher asks questions that require critical thinking | 79 | 69 | 1.60 |
| Teacher asks open-ended questions | 72 | 62 | 1.34 |
| Teacher uses multiple approaches including visual tools | 74 | 40 | 3.78* |
| Teacher use group work in teaching | 83 | 40 | 4.46* |
| Teacher links topic with real life situation or application | 85 | 81 | 0.54 |
| Teacher asks students to research using the internet | 33 | 9 | 3.13* |
| Teacher uses computers in teaching | 76 | 16 | 5.60* |
| Teacher interested with students' errors and misconceptions and discusses it with them | 90 | 97 | 1.41 |
| Teacher gives the opportunity/freedom for students to choose between options during class activities | 52 | 45 | 0.86 |

**3. Use of alternative assessment**

| | CADER intervention group | Matched teachers | Z-value |
|---|---|---|---|
| Teacher grades and corrects assignment | 67 | 55 | 1.53 |
| Students participates with the teacher in grading assignments | 26 | 16 | 1.60 |
| Teacher grades and corrects home assignment | 9 | 19 | 2.12* |
| Students participates with the teacher in grading homeworks | 5 | 7 | 0.45 |
| Students think and self-evaluate their work | 33 | 36 | 0.45 |
| Use of peer review | 29 | 17 | 1.69 |
| Use portfolios | 2 | 0.0 | 1.00 |
| Use the observation method | 60 | 36 | 2.99* |
| Use of grading rubrics | 24 | 10 | 2.31* |
| Exams on paper | 10 | 14 | 0.71 |
| Use of write-off lists | 12 | 10 | 0.33 |

**4. Teaching methods**

| | Those who were trained on the use of modern teaching and assessment methods ONLY | | Those who were trained on the use of modern teaching and assessment methods and on ICT | |
|---|---|---|---|---|
| | Number | % | Number | % |
| Teacher presenting a lecture only | 10 | 25 | 14 | 35 |
| Workshops | 2 | 5 | 2 | 5 |
| Discussions | 28 | 70 | 30 | 75 |
| Investigation | 18 | 45 | 13 | 32.5 |
| Lecture and discussion together | 21 | 52.5 | 23 | 57.5 |
| Problem solving | 14 | 35 | 16 | 40 |
| Work in groups | 21 | 52.5 | 21 | 52.5 |
| Prepare projects | 2 | 5 | 0.0 | 0.0 |
| Applications and practice | 26 | 65 | 25 | 62.5 |
| Assignments and reports | 11 | 27.5 | 12 | 30 |
| Analysis and questioning a classroom situation | 6 | 15.0 | 08 | 20 |
| Independent learning | 7 | 17.5 | 8 | 20 |
| Utilization of ICT | 4 | 10.0 | 2 | 5 |

**5. Assessment methods**

| | Those who were trained on the use of modern teaching and assessment methods ONLY | | Those who were trained on the use of modern teaching and assessment methods and on ICT | |
|---|---|---|---|---|
| | Number | % | Number | % |
| In-class assignments | 60 | 75.5 | 32 | 80 |
| Self assessment | 13 | 16.3 | 3 | 7.5 |
| Use of peer review | 5 | 6.3 | 2 | 5 |
| Use the observation method | 57 | 71.3 | 29 | 72.5 |
| Use of grading rubrics | 38 | 47.5 | 17 | 42.5 |
| Oral assessment | 26 | 32.5 | 15 | 37.5 |
| Pen-pencil assessment | 22 | 27.5 | 11 | 27.5 |
| Use of write-off lists | 22 | 27.5 | 9 | 22.5 |

**Readiness of students to school**

Indicators in this area are:

1. Percentage of children at the different level of readiness to school
2. Percentage of children at the different level of readiness in the following: physical well-being and motor development, social and emotional development, approaches to learning, language development, cognition and general knowledge controlling for KG attendance and by region and gender. Four levels of school readiness were identified for children in the country. The readiness levels are defined as:

**Level 1:** The child is developing readiness slowly, he/she is not ready to school; the skills, knowledge or behavior is absent or rarely observed demonstrated by the child.

**Level 2:** The child is approaching readiness, he/she is in progress; the skills, knowledge or behavior is emerging and is not demonstrated by the child consistently.

**Level 3:** The child is ready for school; he/she is almost proficient; the skills, knowledge or behavior is partially demonstrated by the child but appeared that it will be mastered soon.

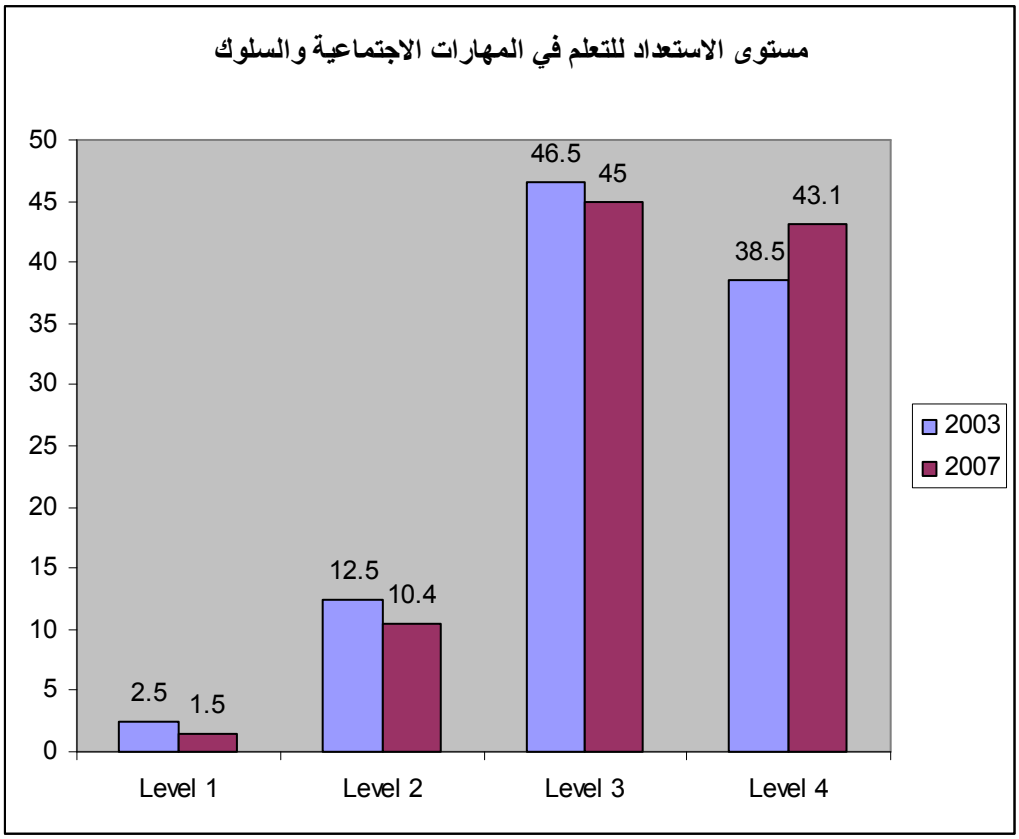
**Level 4:** The child is fully ready for school, he/she is proficient; the skills, knowledge or behavior is firmly within the child's range of performance.

Here are the baseline data:

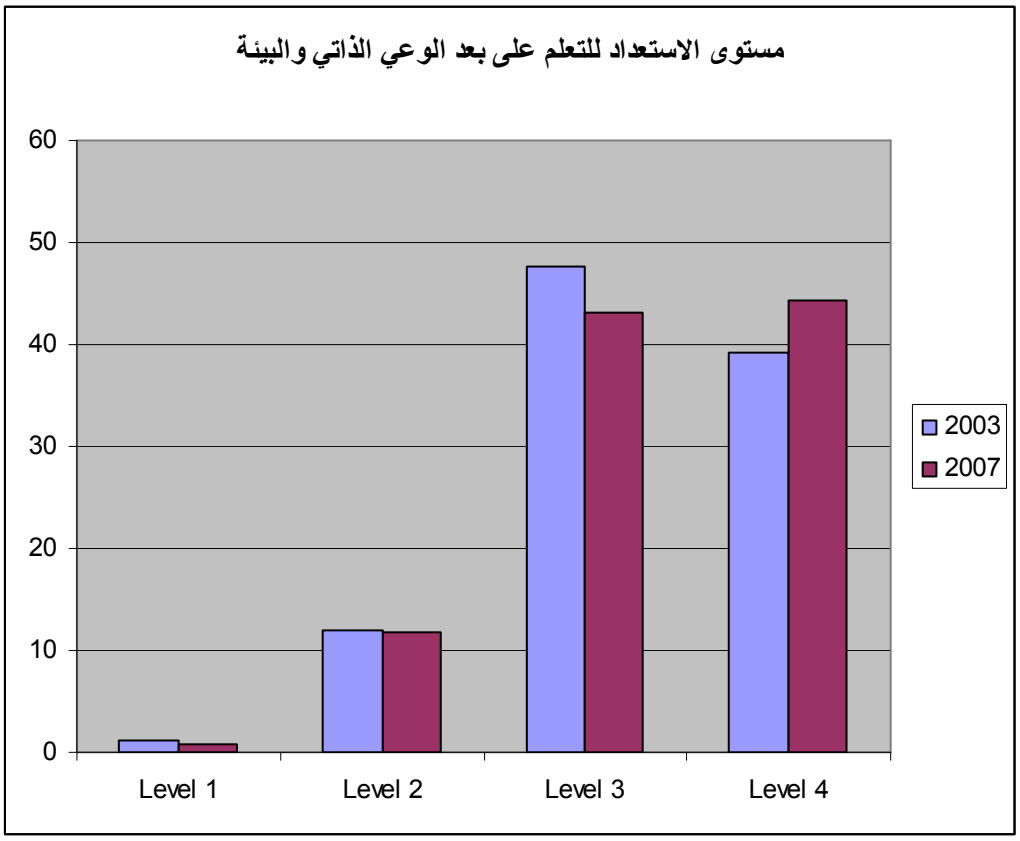
**Table R1: Percentages of children at each of the four levels of school readiness**

| Level of Readiness | Percent | |
|---|---|---|
| | 2003 | 2007 |
| Level 1 | .2 | .2 |
| Level 2 | 6.2 | 6.0 |
| Level 3 | 55.7 | 54.2 |
| Level 4 | 37.9 | 39.7 |
| Sample size | 2645 | 3672 |

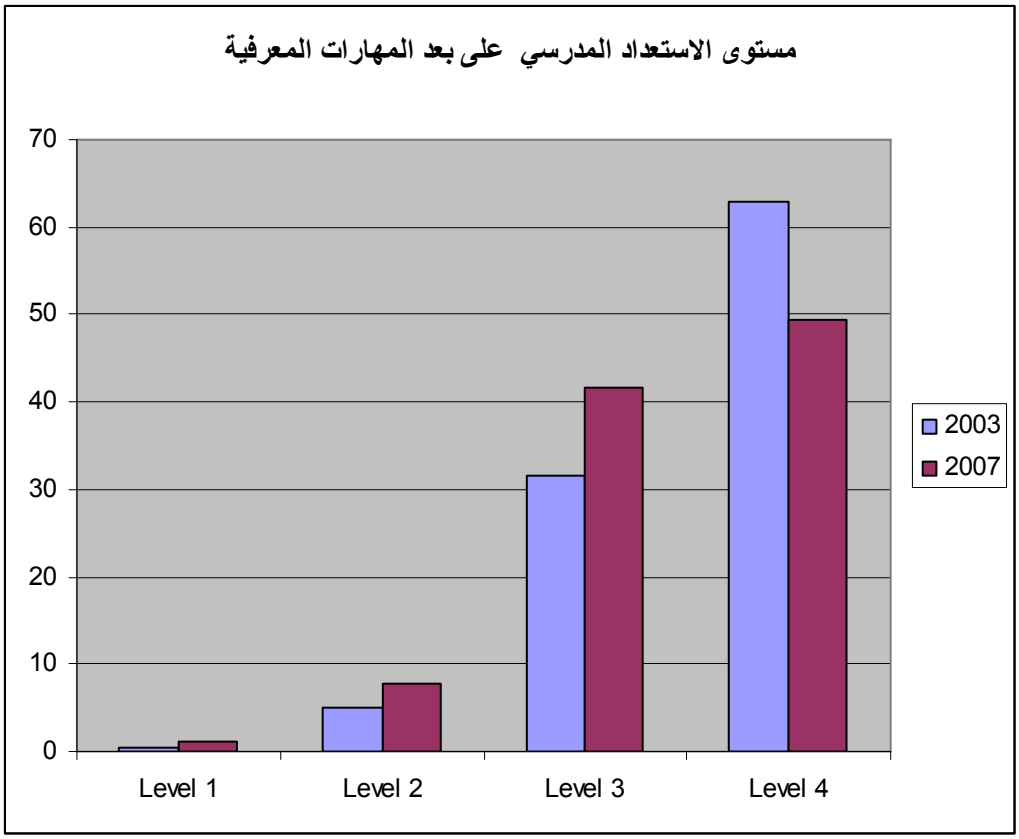
| Table R2: School readiness of children with respect to their social skills and behavior | | |
|---|---|---|
| Level of Readiness | Percent | |
| | 2003 | 2007 |
| Level 1 | 2.5 | 1.5 |
| Level 2 | 12.5 | 10.4 |
| Level 3 | 46.5 | 45.0 |
| Level 4 | 38.5 | 43.1 |




| Table R3: School readiness of children with respect to their awareness of self and environment | | |
|---|---|---|
| Level of Readiness | Percent | |
| | 2003 | 2007 |
| Level 1 | 1.2 | .7 |
| Level 2 | 11.9 | 11.7 |
| Level 3 | 47.7 | 43.2 |
| Level 4 | 39.2 | 44.4 |




| Table R4: School readiness of children with respect to their cognitive skills | | |
|---|---|---|
| Level of Readiness | Percent | |
| | 2003 | 2007 |
| Level 1 | .5 | 1.1 |
| Level 2 | 5.1 | 7.8 |
| Level 3 | 31.5 | 41.6 |
| Level 4 | 62.9 | 49.5 |




| **Table R5: School readiness of children with respect to their Language and communication skills** | | |
|---|---|---|
| Level of Readiness | Percent | |
| | 2003 | 2007 |
| Level 1 | 1.5 | 1.5 |
| Level 2 | 17.4 | 17.4 |
| Level 3 | 51.1 | 49.9 |
| Level 4 | 30.0 | 31.2 |

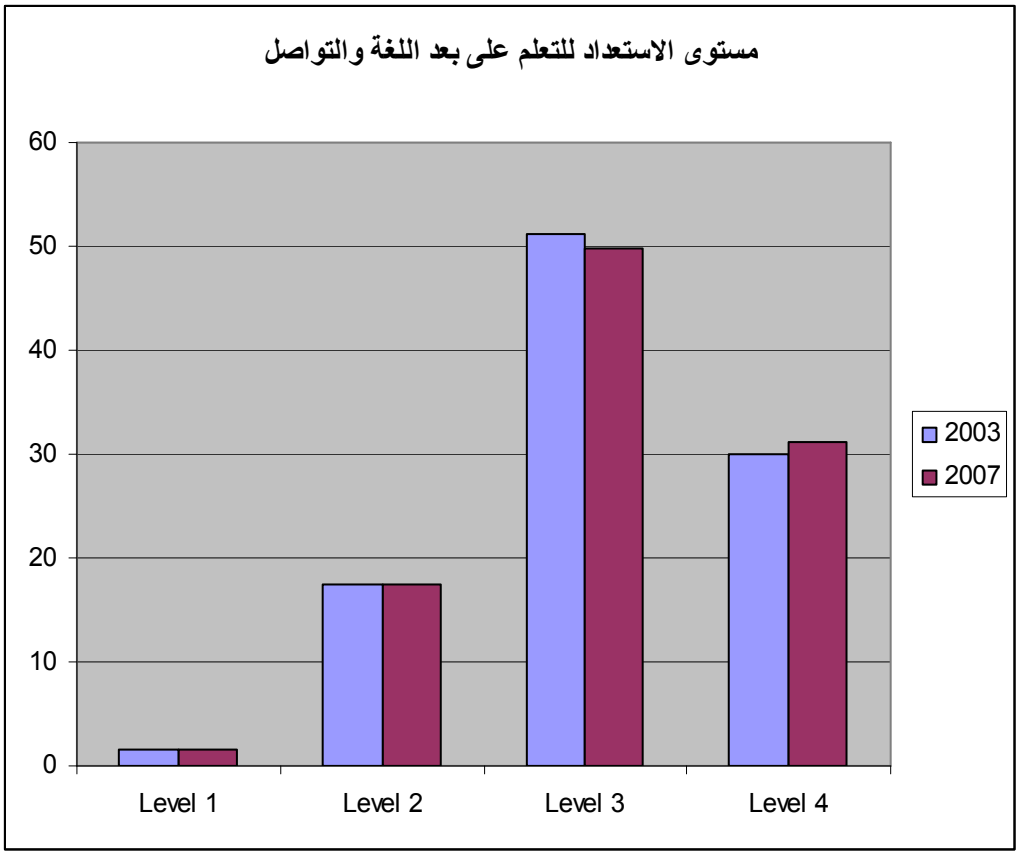
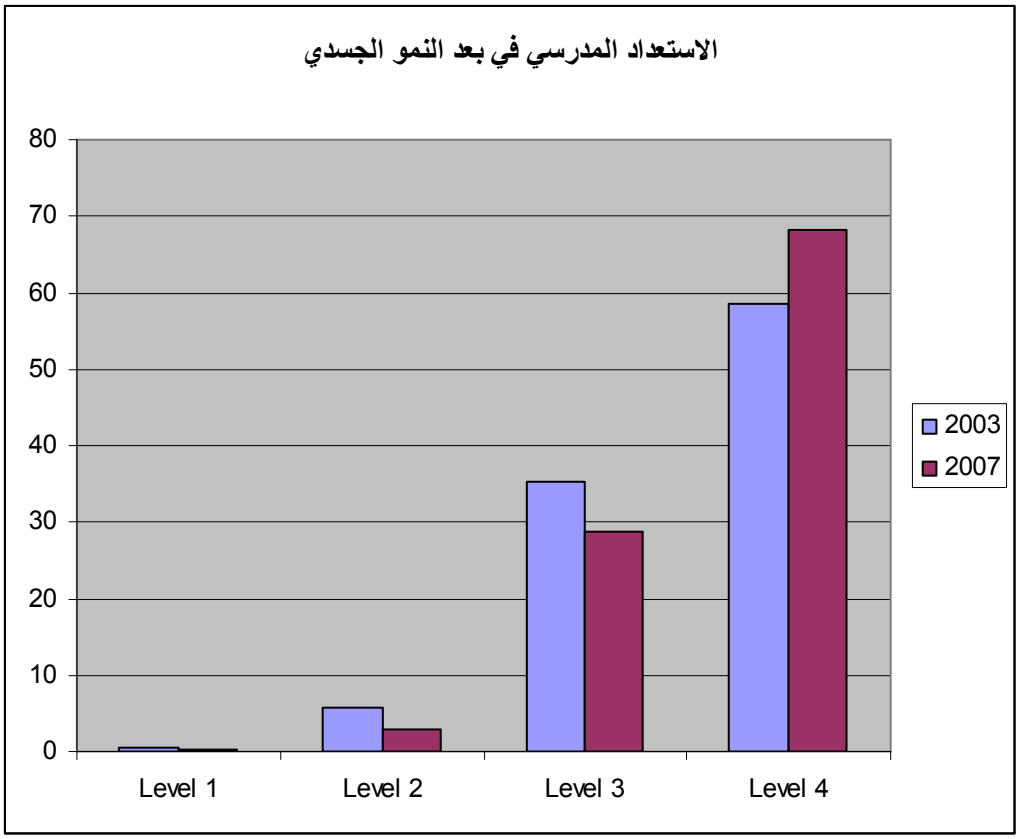
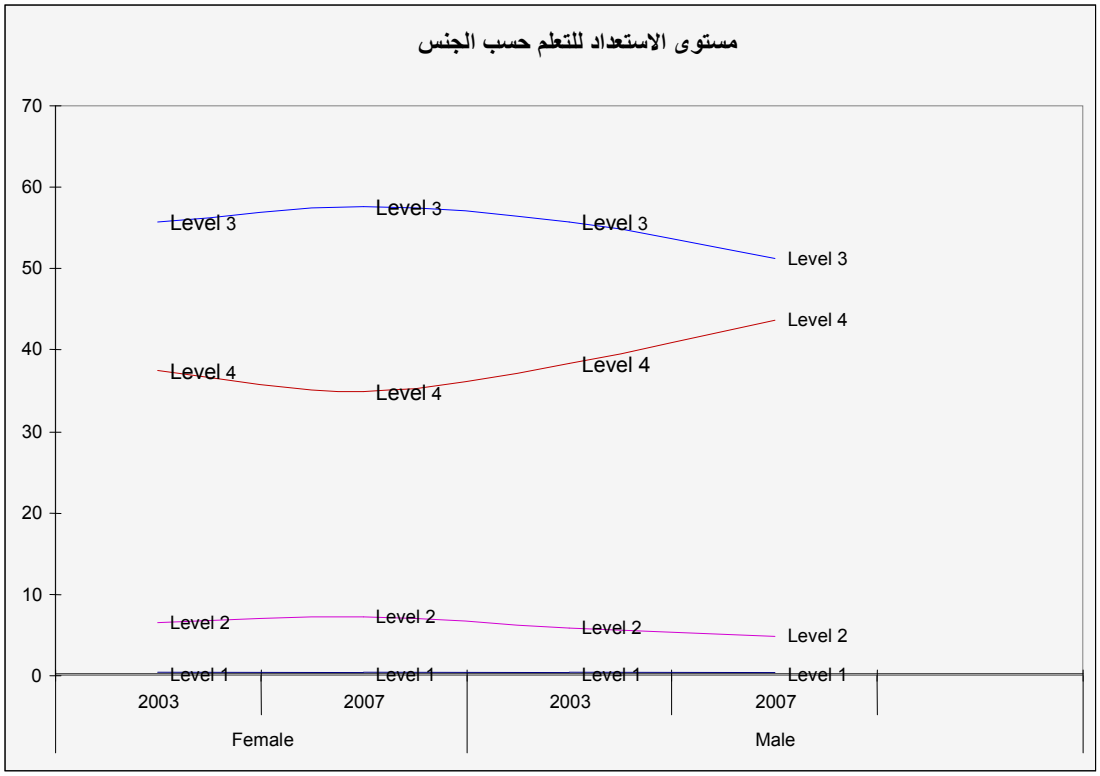



**Table R6: School readiness of children with respect to their physical development**

| Level of Readiness | Percent | |
|---|---|---|
| | 2003 | 2007 |
| Level 1 | .5 | .2 |
| Level 2 | 5.8 | 2.8 |
| Level 3 | 35.2 | 28.7 |
| Level 4 | 58.6 | 68.3 |

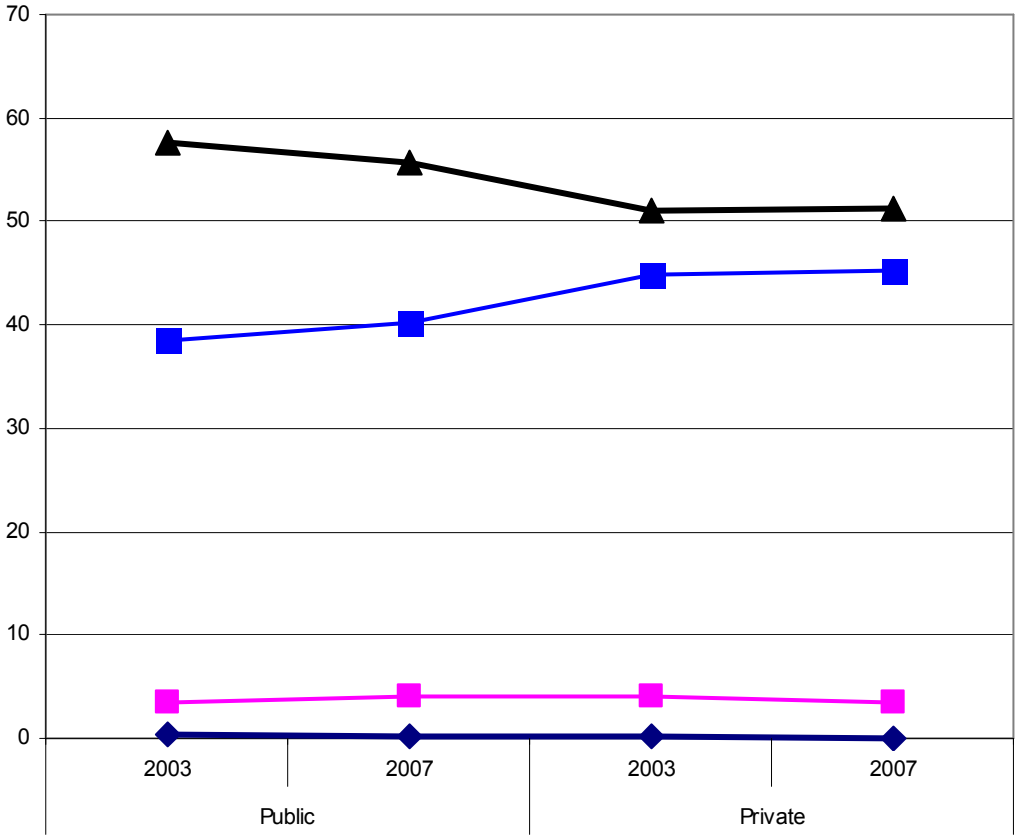



| **Table R7:** School readiness of children **by gender.** | | | | |
|---|---|---|---|---|
| Level of Readiness | Female | | Male | |
| | 2003 | 2007 | 2003 | 2007 |
| Level 1 | .2 | 0.1 | .1 | 0.2 |
| Level 2 | 6.6 | 7.2 | 5.8 | 4.9 |
| Level 3 | 55.7 | 57.7 | 55.7 | 51.2 |
| Level 4 | 37.5 | 35.0 | 38.4 | 43.7 |



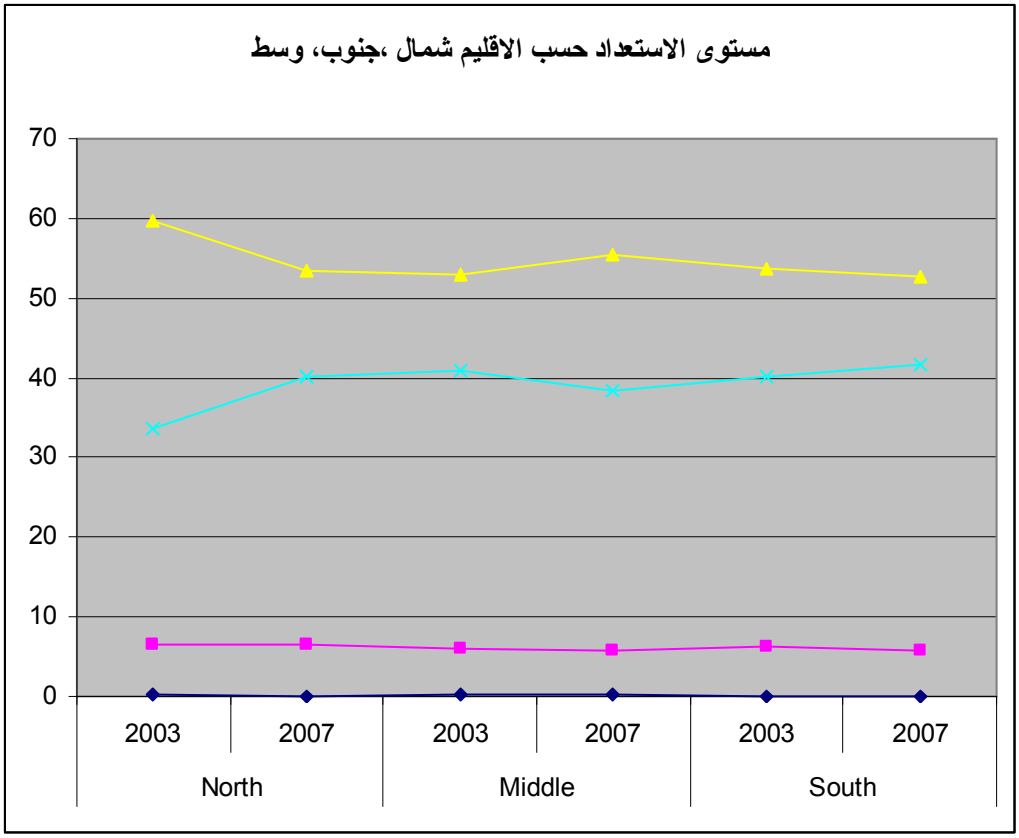

| Table R8: School readiness of children controlling for kindergarten enrollment | | | | |
|---|---|---|---|---|
| Level of Readiness | Yes | | No | |
| | 2003 | 2007 | 2003 | 2007 |
| Level 1 | .1 | 0.1 | .3 | 0.4 |
| Level 2 | 4.0 | 3.6 | 13.3 | 14.8 |
| Level 3 | 52.1 | 51.9 | 67.6 | 63.1 |
| Level 4 | 43.8 | 44.5 | 18.8 | 21.7 |

| Table R9: School readiness of children by the type of kindergarten enrolled at (private or public) | | | | |
|---|---|---|---|---|
| Level of Readiness | Public | | Private | |
| | 2003 | 2007 | 2003 | 2007 |
| Level 1 | .4 | 0.1 | .1 | .0 |
| Level 2 | 3.4 | 4.0 | 4.1 | 3.5 |
| Level 3 | 57.7 | 55.6 | 51.1 | 51.2 |
| Level 4 | 38.5 | 40.2 | 44.8 | 45.2 |


70
60
50
40
30
20
10
0
2003
2007
2003
2007
Public
Private

| Table R10: School readiness of children by location (urban or rural) | | | | |
|---|---|---|---|---|
| **Level of Readiness** | **Urban** | | **Rural** | |
| | 2003 | 2007 | 2003 | 2007 |
| Level 1 | .1% | .1% | .2% | .2% |
| Level 2 | 3.8% | 5.5 | 9.0 | 6.5 |
| Level 3 | 52.8% | 52.2 | 59.3 | 55.6 |
| Level 4 | 43.3% | 42.2 | 31.5 | 37.8 |

| Table R11: School readiness of children by region (north, middle, south) | | | | | | |
|---|---|---|---|---|---|---|
| Level of Readiness | North | | Middle | | South | |
| | 2003 | 2007 | 2003 | 2007 | 2003 | 2007 |
| Level 1 | .2 | .1 | .2 | .3 | 0 | 0 |
| Level 2 | 6.4 | 6.4 | 6.1 | 5.8 | 6.2 | 5.8 |
| Level 3 | 59.8 | 53.4 | 52.9 | 55.5 | 53.6 | 52.6 |
| Level 4 | 33.7 | 40.1 | 40.9 | 38.5 | 40.2 | 41.6 |



| **Table R12:** School readiness of children by **socioeconomic status** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Level of Readiness | Family Income (JD) | | | | | | | |
| | Less than 299 | | 300-599 | | 600-899 | | More than 900 | |
| | 2003 | 2007 | 2003 | 2007 | 2003 | 2007 | 2003 | 2007 |
| Level 1 | .2 | .3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Level 2 | 7.0 | 8.0 | 3.5 | 2.7 | 1.1 | .6 | 0 | 2 |
| Level 3 | 60.3 | 59.4 | 45.9 | 48 | 35.2 | 28.3 | 71.4 | 34.7 |
| Level 4 | 32.4 | 32.4 | 50.7 | 49.3 | 63.7 | 71.1 | 28.6 | 63.3 |

| **Table R13: School readiness of children by father education** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Level of Readiness** | **Illiterate** | | **Lower basic** | | **Upper Basic** | | **Secondary** | | **Diploma** | | **University** | |
| | 2003 | 2007 | 2003 | 2007 | 2003 | 2007 | 2003 | 2007 | 2003 | 2007 | 2003 | 2007 |
| Level 1 | 1.2 | 1.4 | 0 | .2 | .2 | 0 | .1 | .2 | 0 | 0 | 0 | 0 |
| Level 2 | 14.7 | 18.3 | 10.8 | 12.4 | 9.1 | 7.3 | 4.8 | 3.1 | 3.1 | 2.9 | 1.3 | 1.9 |
| Level 3 | 66.5 | 63.4 | 64.8 | 66.5 | 60.2 | 61.5 | 54.8 | 55.6 | 51.5 | 46.6 | 44.6 | 34.5 |
| Level 4 | 17.6 | 16.9 | 24.4 | 21 | 30.5 | 31.2 | 40.2 | 41.1 | 45.4 | 50.4 | 54.0 | 63.7 |

| **Table (R14): School readiness of children mother's education** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Level of Readiness** | ***Illiterate*** | | **Lower basic** | | **Upper Basic** | | **Secondary** | | **Diploma** | | **Univ.** | |
| | 2003 | 2007 | 2003 | 2007 | 2003 | 2007 | 2003 | 2007 | 2003 | 2007 | 2003 | 2007 |
| Level 1 | .8 | .7 | 0 | .2 | .2 | .2 | .1 | 0 | 0 | .2 | 0 | 0 |
| Level 2 | 17.3 | 18.7 | 12.3 | 12.9 | 7.2 | 4.9 | 4.2 | 3.9 | 1.8 | 2.8 | .8 | .5 |
| Level 3 | 66.2 | 62.2 | 63.4 | 63.9 | 63.6 | 64 | 54.7 | 55.9 | 46.2 | 43.4 | 40.9 | 33.0 |
| Level 4 | 15.6 | 18.4 | 24.3 | 23 | 28.9 | 30.9 | 41.0 | 40.2 | 51.9 | 53.7 | 58.3 | 66.6 |

| **Table (R15) Correlation matrix for family size, number of siblings, and total scores of school readiness.** | | |
|---|---|---|
| Variables | Scores of school readiness | |
| | 2003 | 2007 |
| Family size | -.15 (.000) | -0.042(0.000) |
| Number of siblings | -.16 (.000) | -0.17(0.000) |

| Table R16: School readiness of children in local communities where KGs have been newly established | | |
|---|---|---|
| Level of Readiness | Percent | |
| | 2003 | 2007 |
| Level 1 | .3 | .1 |
| Level 2 | 7.3 | 5.0 |
| Level 3 | 63.2 | 55.7 |
| Level 4 | 29.1 | 39.3 |

| Table R17: School readiness of children in local communities with respect to their social skills and behavior | | |
|---|---|---|
| Level of Readiness | Percent | |
| | 2003 | 2007 |
| Level 1 | 2.5 | 2.2 |
| Level 2 | 14.3 | 10.2 |
| Level 3 | 52.3 | 47.1 |
| Level 4 | 30.9 | 40.5 |

| Table R18: School readiness of children in local communities with respect to their awareness of self and environment | | |
|---|---|---|
| Level of Readiness | Percent | |
| | 2003 | 2007 |
| Level 1 | 1.0 | 1.0 |
| Level 2 | 14.5 | 11.3 |
| Level 3 | 45.4 | 42.4 |
| Level 4 | 39.1 | 45.3 |

| Table R19: School readiness of children in local communities with respect to their cognitive skills | | |
|---|---|---|
| Level of Readiness | Percent | |
| | 2003 | 2007 |
| Level 1 | .6 | .8 |
| Level 2 | 6.9 | 6.4 |
| Level 3 | 34.9 | 39.3 |
| Level 4 | 57.6 | 53.5 |

| Table R20: Readiness of children to school in local communities with respect to their Language and communication skills | | |
|---|---|---|
| Level of Readiness | Percent | |
| | 2003 | 2007 |
| Level 1 | 1.9 | 1.5 |
| Level 2 | 21.4 | 16.4 |
| Level 3 | 53.8 | 50.3 |
| Level 4 | 22.9 | 31.8 |

| Table R21: Readiness of children to school in local communities with respect to their physical development | | |
|---|---|---|
| Level of Readiness | Percent | |
| | 2003 | 2007 |
| Level 1 | .4 | .2 |
| Level 2 | 5.3 | 1.8 |
| Level 3 | 34.7 | 27.1 |
| Level 4 | 59.6 | 71.0 |

The following two tables show the quality of kindergarten environment:

| Table 2: Quality of public kindergartens | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | KG Environment | space and furnishing | personal care routines | language and reasoning | activities | interaction | program structure | parents and staff |
| Inadequate | 13.1 | 38.6 | 9.6 | 13.3 | 36.1 | 4.8 | 19.3 | 13.3 |
| Minimal | 42.9 | 27.7 | 34.9 | 32.5 | 39.8 | 12.0 | 22.9 | 67.5 |
| Good | 42.9 | 27.7 | 42.2 | 31.3 | 24.1 | 39.8 | 26.5 | 16.9 |
| Excellent | 1.2 | 6.0 | 13.3 | 22.9 | 0.0 | 43.4 | 31.3 | 2.4 |

1. Inadequate: the KG environment is lacking the basic requirements and resources/materials indicating a lack of care that is not good for children's development.
2. Minimal: the KG environment has the minimum basic requirements and resources indicating type of care that meets to some small degree basic developmental needs.
3. Good: the KG environment has adequate and suitable requirements and resources indicating that the basic tenets of developmentally appropriate care exist.
4. Excellent: the KG environment has outstanding requirements and resources which provide high quality care that expands children's experiences, extends their learning, and provides warm and caring support.

| Table 3: Quality of KGs by Public Private under the subscales | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Inadequate | | Minimal | | Good | | Excellent | |
| Subscales | public | private | public | private | public | private | public | private |
| Space and furnishing | 38.6 | 47.8 | 27.7 | 30.4 | 27.7 | 17.4 | 6.0 | 4.3 |
| Personal care routines | 9.6 | 21.7 | 34.9 | 26.1 | 42.2 | 26.1 | 13.3 | 26.1 |
| Language-reasoning | 13.3 | 39.1 | 32.2 | 34.8 | 31.3 | 17.4 | 22.9 | 8.7 |
| Activities | 36.1 | 69.6 | 39.8 | 26.1 | 24.1 | 4.3 | 0.0 | 0.0 |
| Interaction | 4.8 | 17.4 | 12.0 | 21.7 | 39.8 | 39.1 | 43.4 | 21.7 |
| Program structure | 19.3 | 52.2 | 22.9 | 17.4 | 26.5 | 17.4 | 31.3 | 13.0 |
| Parents and staff | 13.3 | 30.4 | 67.5 | 60.9 | 16.9 | 4.3 | 2.4 | 4.3 |

**Achievement level and characteristics of current graduate from the different cycles**

Data on student performance and the effectiveness of the current curriculum is captured from international and national studies. The Trends in International Mathematics and Science Study (TIMSS), Program in International Student Assesssment (PISA) in additional to NAfKE and MOE quality assurance exams are used. Data on the following indicators are used:

1. Overall performance of students in math and science at the eighth grade
2. Percentage of children at each level of competency in math and science. The Appendix shows the definitions of the international benchmarks in competency level.
3. Performance by content domains
4. Performance by cognitive domains
5. Performance by gender, urban/rural and school type (private, public, UNRWA)

Student achievement situation in the basic skill proposed in ERfKE at the different grades and education cycle are estimated/measured through three major tools and dimensions:

1. National Exams (MOE and NCHRD)
2. Trends in International Mathematics and Science Study
3. Tawjihi results
4. level of mastery of the knowledge economy skills (such as problem solving, critical thinking, ICT skills)
5. level of reading and writing skills
6. level in science skills
7. level in math skill

For the 8$^{th}$ grade we use TIMSS, for the 12$^{th}$ grade we use the Tawjihe data and for the other grades we use both the NCHRD's NAfKE and national tests (for 4$^{th}$ grade) and the national assessment tests by MOE. Data from Tawjihi which is an assessment proxy for the quality of the graduate of schooling system is shown below.

| Table 4: TIMSS results for 8th grade by year | | | |
|---|---|---|---|
| Subject | 1999 | 2003 | 2007 |
| Science | 450 | 475 | 482 |
| Mathematics | 428 | 424 | 427 |

| Performance in TIMSS between 2003 and 2007 | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Overall | Female | Male | | Overall | Female | Male |
| **Science** | | | | **Math** | | | |
| **2003** | 475 | 489 | 462 | **2003** | 424 | 438 | 411 |
| **2007** | 482 | 499 | 466 | **2007** | 427 | 438 | 417 |
| | | | | | | | |
| **Biology** | | | | **Number** | | | |
| **2003** | 475 | 493 | 458 | **2003** | 413 | 426 | 401 |
| **2007** | 478 | 493 | 464 | **2007** | 416 | 419 | 414 |
| **Chemistry** | | | | **Algebra** | | | |
| **2003** | 478 | 496 | 461 | **2003** | 434 | 426 | 410 |
| **2007** | 491 | 514 | 470 | **2007** | 448 | 461 | 436 |
| **Physics** | | | | **Geometry** | | | |
| **2003** | 465 | 474 | 457 | **2003** | 446 | 455 | 438 |
| **2007** | 479 | 492 | 467 | **2007** | 436 | 447 | 425 |
| **Earth Science** | | | | **Data and Chance** | | | |
| **2003** | 472 | 478 | 466 | **2003** | 430 | 452 | 418 |
| **2007** | 484 | 496 | 473 | **2007** | 425 | 434 | 417 |
| | | | | | | | |
| **Knowing** | | | | **Knowing** | | | |
| **2003** | | | | **2003** | | | |
| **2007** | 485 | 501 | 470 | **2007** | 422 | 431 | 414 |
| **Applying** | | | | **Applying** | | | |
| **2003** | | | | **2003** | | | |
| **2007** | 491 | 506 | 477 | **2007** | 432 | 444 | 421 |
| **Reasoning** | | | | **Reasoning** | | | |
| **2003** | | | | **2003** | | | |
| **2007** | 471 | 489 | 454 | **2007** | 440 | 450 | 432 |

The following table shows the levels the performance in math and science:

| **TIMSS Achievement by international benchmarks across countries (percentage of students)** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Below the lowest level | | Low International Benchmark | | Intermediate International Benchmark | | High International Benchmark | | Advanced international Benchmark | |
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| Science | 20% | 21% | 27% | 23% | 32% | 30% | 18% | 21% | 3% | 5% |
| Mathematics | 40% | 39% | 30% | 25% | 22% | 24% | 7% | 10% | 1% | 1% |

| **Table 5: NAfKE's Results at baseline and 2008** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Grade** | **Subject** | 2006 | 2008 | | | | | |
| **5** | **Mathematics** | 28.4 | 29.0 | | | | | |
| | **Science** | 49.5 | 49.6 | | | | | |
| | **Reading** | 46.9 | 50.3 * | | | | | |
| **9** | **Mathematics** | 36.8 | 38.7 * | | | | | |
| | **Science** | 41.2 | 45.7 * | | | | | |
| | **Reading** | 45.9 | 54.6 * | | | | | |
| **11** | **Mathematics** | 25.9 | 29.4 * | | | | | |
| | **Science** | 40.4 | 41.7 | | | | | |
| | **Reading** | 53.2 | 60.6 * | | | | | |
| * 2008 average is significantly higher than 2006 average @ $\alpha = 0.05$ | | | | | | | | |
| | | | **Mathematics** | | **Science** | | **Reading** | |
| | **Gender** | year | Average | Std. error | Average | Std. error | Average | Std. error |
| **5** | **Male** | 2008 | 25.1 | 0.49 | 42.6 | 0.81 | 43.1 | 0.95 |
| | | 2006 | 26 | 0.66 | 46 | 1.03 | 41 | 1.09 |
| | **Female** | 2008 | 31.3 | 0.42 | 53.8 | 0.61 | 54.6 | 0.71 |
| | | 2006 | 29 | 0.68 | 50 | 1.00 | 49 | 0.98 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **9** | **Male** | 2008 | 35.9 | 0.65 | 43.2 | 0.82 | 48.6 | 0.8 |
| | | 2006 | 33 | 0.80 | 36 | 0.91 | 39 | 0.81 |
| | **Female** | 2008 | 40.9 | 0.56 | 47.9 | 0.69 | 60.0 | 0.71 |
| | | 2006 | 34 | 0.77 | 40 | 1.00 | 50 | 0.83 |
| **11** | **Male** | 2008 | 27.9 | 0.62 | 37.7 | 0.93 | 54.4 | 0.73 |
| | | 2006 | 23 | 0.17 | 35 | 1.00 | 47 | 0.84 |
| | **Female** | 2008 | 30.7 | 0.55 | 45.3 | 0.91 | 66.1 | 0.55 |
| | | 2006 | 25 | 0.79 | 40 | 0.93 | 59 | 0.61 |

| | | | **Mathematics** | | **Science** | | **Reading** | |
|---|---|---|---|---|---|---|---|---|
| | **Region** | year | Average | Std. error | Average | Std. error | Average | Std. error |
| **5** | **Urban** | 2008 | 29.56 | 0.39 | 50.23 | 0.57 | 50.97 | 0.67 |
| | | 2006 | 27 | 0.46 | 49 | 0.73 | 46 | 0.8 |
| | **Rural** | 2008 | 27.05 | 0.63 | 47.4 | 1.06 | 47.84 | 1.23 |
| | | 2006 | 27 | 0.46 | 48 | 1.13 | 43 | 1.3 |
| **9** | **Urban** | 2008 | 39.11 | 0.34 | 46.31 | 0.60 | 46.31 | 0.60 |
| | | 2006 | 36 | 0.60 | 40 | 0.68 | 46 | 0.6 |
| | **Rural** | 2008 | 36.89 | 0.97 | 43.21 | 1.17 | 43.21 | 1.17 |
| | | 2006 | 29 | 0.90 | 32 | 1.45 | 40 | 1.4 |
| **11** | **Urban** | 2008 | 30.52 | 0.46 | 43.54 | 0.71 | 43.54 | 0.71 |
| | | 2006 | 25 | 0.47 | 40 | 0.74 | 55 | 0.6 |
| | **Rural** | 2008 | 23.23 | 0.79 | 30.84 | 1.54 | 30.84 | 1.54 |
| | | 2006 | 18 | 0.81 | 31 | 1.59 | 47 | 1.2 |

| | | | **Mathematics** | | **Science** | | **Reading** | |
|---|---|---|---|---|---|---|---|---|
| | **Type** | year | Average | Std. error | Average | Std. error | Average | Std. error |
| **5** | **Discovery** | 2008 | 30.6 | 0.76 | 51.6 | 0.99 | 55.3 | 1.28 |
| | | 2006 | 28 | 0.69 | 52 | 0.99 | 49.6 | 1.1 |
| | **Non-Discovery** | 2008 | 26.7 | 0.95 | 48.7 | 1.96 | 47.5 | 2.18 |
| | | 2006 | 27 | 0.52 | 46 | 0.77 | 42.9 | 0.8 |
| **9** | **Discovery** | 2008 | 40.1 | 0.85 | 46.6 | 1.04 | 57.1 | 1.08 |
| | | 2006 | 39 | 0.85 | 42 | 0.88 | 48.1 | 0.8 |
| | **Non-Discovery** | 2008 | 31.9 | 1.38 | 36.9 | 1.88 | 48.5 | 1.86 |
| | | 2006 | 31 | 0.61 | 35 | 0.87 | 41.7 | 0.8 |
| **11** | **Discovery** | 2008 | 29.9 | 0.79 | 44.5 | 1.20 | 63.9 | 0.76 |
| | | 2006 | 27 | 0.66 | 42 | 0.93 | 57.6 | 0.7 |

| | | | **Mathematics** | **Science** |
|---|---|---|---|---|
| | **Cognitive Domain** | year | Average | Average |
| **5** | **Knowing** | 2008 | 51.0 | 56.3 |
| | | 2006 | 49.2 | 57.2 |
| | **Applying** | 2008 | 21.3 | 44.3 |
| | | 2006 | 19.2 | 44.3 |
| | **Logic** | 2008 | 31.9 | 41.1 |
| | | 2006 | 31.1 | 39.7 |
| **9** | **Knowing** | 2008 | 62.4 | 51.71 |
| | | 2006 | 58.9 | 50.23 |

| | | | **Mathematics** | **Science** |
|---|---|---|---|---|
| | **Cognitive Domain** | year | Average | Average |
| | **Applying** | 2008 | 36.4 | 32.5 |
| | | 2006 | 33.8 | 28.8 |
| | **Logic** | 2008 | 34.5 | |
| | | 2006 | 30.4 | |
| **11** | **Knowing** | 2008 | 41.4 | 39.38 |
| | | 2006 | 39.7 | 35.54 |
| | **Applying** | 2008 | 41.4 | 45.84 |
| | | 2006 | 36.9 | 44.08 |
| | **Logic** | 2008 | 23.7 | 33.98 |
| | | 2006 | 21.0 | 33.66 |

| | **Cognitive Domain** | year | Very low | Low | Middle | High | Advanced |
|---|---|---|---|---|---|---|---|
| **Math** | **5** | 2008 | 71 | 20.8 | 6.3 | 1.3 | 0.5 |
| | | 2006 | 73 | 20 | 6 | 2 | - |
| | **9** | 2008 | 44.1 | 32.8 | 15.8 | 6.4 | 0.9 |
| | | 2006 | 52 | 26 | 16 | 4 | - |
| | **11** | 2008 | 72.1 | 16.7 | 8.9 | 1.8 | 0.5 |
| | | 2006 | 75 | 18 | 6 | 1 | - |
| **Science** | **5** | 2008 | 21.1 | 24.9 | 30.5 | 16.8 | 6.8 |
| | | 2006 | 21 | 25 | 33 | 16 | 6 |
| | **9** | 2008 | 30.9 | 27.4 | 23.2 | 14.6 | 4 |

| | Cognitive Domain | year | Very low | Low | Middle | High | Advanced |
|---|---|---|---|---|---|---|---|
| | | 2006 | 41 | 24 | 24 | 11 | 1 |
| | **11** | 2008 | 44.5 | 19.7 | 16.1 | 13.7 | 6 |
| | | 2006 | 43 | 23 | 20 | 11 | 3 |
| **Reading** | **5** | 2008 | 29.7 | 19.4 | 22 | 16.3 | 12.5 |
| | | 2006 | 31 | 21 | 24 | 18 | 6 |
| | **9** | 2008 | 19.5 | 23 | 24.7 | 21.5 | 11.3 |
| | | 2006 | 25 | 32 | 31 | 12 | 1 |
| | **11** | 2008 | 9.3 | 13.6 | 30.2 | 33.9 | 13 |
| | | 2006 | 15 | 22 | 36 | 24 | 2 |

**Table T1: Achievement of student in the Tawjihi Examination**

| | 2003 | | | | | 2007 | |
|---|---|---|---|---|---|---|---|
| | Overall | Male | Female | | Overall | Male | Female |
| **Amman** | 41.51 | 32.48 | 50.71 | | 52.32 | 43.11 | 61.76 |
| **Madaba** | 45.74 | 32.71 | 60.13 | | 52.44 | 45.53 | 60.27 |
| **Irbid** | 39.08 | 29.58 | 48.88 | | 46.17 | 37.91 | 54.92 |
| **Jarask** | 36.04 | 29.87 | 41.99 | | 47.58 | 40.90 | 53.83 |
| **Ajloun** | 36.00 | 27.87 | 43.79 | | 40.00 | 32.72 | 47.32 |
| **Mafraq** | 36.36 | 30.06 | 42.76 | | 42.73 | 35.77 | 49.58 |
| **Zarqa** | 35.93 | 28.23 | 43.32 | | 47.07 | 37.81 | 55.87 |
| **Balqa** | 39.57 | 32.21 | 47.43 | | 49.35 | 42.89 | 56.08 |
| **Karak** | 37.92 | 31.44 | 44.12 | | 46.06 | 39.00 | 52.72 |
| **Tafeela** | 37.68 | 27.62 | 47.94 | | 52.40 | 44.63 | 59.93 |
| **Maan** | 41.33 | 31.39 | 50.62 | | 39.12 | 28.95 | 48.09 |
| **Aqaba** | 36.09 | 27.74 | 43.58 | | 44.09 | 29.64 | 57.71 |
| **MOE** | 24.68 | 14.58 | 41.38 | | 75.00 | 63.64 | 100.00 |
| **All** | 39.36 | 30.78 | 48.00 | | 48.73 | 40.25 | 57.32 |

**Performance in other grades**

NCHRD conducted national student assessment until 2004. After that the ministry of education has been conducting census assessment annually. The following are the results of the latest national assessment for the 10$^{th}$ grade nationwide.

| Results from the national assessment for quality assurance for the 10th graders (2007/2008) | | | | |
|---|---|---|---|---|
| | Low level | Partial competency | Competent | Advanced |
| Arabic | 19% | 35% | 39% | 7% |
| English | 40% | 33% | 24% | 3% |
| Math | 54% | 28% | 14% | 4% |
| Science | 45% | 40% | 14% | 1% |

NCHRD in response to the ERfKE project established a new assessment for knowledge economy skills through the National Assessment of Knowledge Economy Skills. The test was conducted twice, in 2006 and 2008. NAfKE targeted Grades 5th, 9th , and 11th grades in the context of Mathematics, Science and Arabic Language. The following shows the results:

| **NAfKE: Average Scores by year Grade and Subject** | | | |
|---|---|---|---|
| **Grade** | **Subject** | **2006** | **2008** |
| **5** | **Mathematics** | **28.4** | **29.0** |
| | **Science** | **49.5** | **49.6** |
| | **Reading** | **46.9** | **50.3 *** |
| **9** | **Mathematics** | **36.8** | **38.7 *** |
| | **Science** | **41.2** | **45.7 *** |
| | **Reading** | **45.9** | **54.6 *** |
| **11** | **Mathematics** | **25.9** | **29.4 *** |
| | **Science** | **40.4** | **41.7** |
| | **Reading** | **53.2** | **60.6 *** |

* 2008 average is significantly higher than 2006 average @ $\alpha = 0.05$

**Appendix 1:**
The following Tables show the indicators from the NCHRD's national test (2004) but the test has been replaced by the national assessment by MOE:

Overall by levels:

**Percentage of students by competency levels in language**

| | Comprehension | | Writing | | Grammar | | Dictionary | |
|---|---|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** | **03** | **07** |
| Unacceptable level | 23% | | 33% | | 18% | | 27% | |
| Modest | 73% | | 35% | | 25% | | 58% | |
| Master | 5% | | 32% | | 57% | | 15% | |

**Percentage of students by competency levels in Mathematics**

| | Knowledge and application of mathematical procedures | | Problem solving | | Mathematical thinking and communication | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| Unacceptable level | 41% | | 70% | | 17% | |
| Modest | 49% | | 26% | | 57% | |
| Master | 10% | | 4% | | 26% | |

| **4th Grade Students' Performance on the Arabic Test in 2004** | | | | | | |
|---|---|---|---|---|---|---|
| | N | | Mean | | Std. | |
| | **03** | **07** | **03** | **07** | **03** | **07** |
| GRAMMAR | 1348 | | 65.1 | | 30.1 | |
| WRITING | 1348 | | 45.5 | | 35.2 | |
| COMPREHESION | 685 | | 36.0 | | 22.3 | |
| DICTIONARY USE | 685 | | 37.6 | | 43.8 | |
| TOTAL SCORE | 1348 | | 48.0 | | 24.9 | |

| **Arabic Test Scores of the MOE 4th Grade Students** | | | | | | |
|---|---|---|---|---|---|---|
| | N | | Mean | | Std. | |
| | **03** | **07** | **03** | **07** | **03** | **07** |
| GRAMMAR | 1014 | | 63.5 | | 30.8 | |
| WRITING | 1014 | | 43.2 | | 34.7 | |
| COMPREHESION | 516 | | 35.6 | | 22.5 | |
| DICTIONARY USE | 516 | | 37.4 | | 44.4 | |
| TOTAL SCORE | 1014 | | 46.6 | | 25.2 | |

| **Arabic Language Test Scores of the 4th Grade Female Students** | | | | | | |
|---|---|---|---|---|---|---|
| | N | | Mean | | Std. | |
| | **03** | **07** | **03** | **07** | **03** | **07** |
| GRAMMAR | 634 | | 69.68 | | 27.02 | |
| WRITING | 634 | | 52.81 | | 34.56 | |
| COMPREHESION | 319 | | 39.73 | | 21.46 | |
| DICTIONARY USE | 319 | | 42.63 | | 45.04 | |
| TOTAL SCORE | 634 | | 53.42 | | 24.01 | |

| **2004 Arabic Language Test Scores of the 4th Grade Male Student** | | | | | | |
|---|---|---|---|---|---|---|
| | N | | Mean | | Std. | |
| | **03** | **07** | **03** | **07** | **03** | **07** |
| GRAMMAR | 714 | | 60.97 | | 32.04 | |
| WRITING | 714 | | 39.08 | | 34.51 | |
| COMPREHESION | 366 | | 32.76 | | 22.53 | |
| DICTIONARY USE | 366 | | 33.19 | | 42.17 | |
| TOTAL SCORE | 714 | | 43.12 | | 24.76 | |

| **2004 Arabic Language Test Scores of the Grade 4 Students in Urban School** | | | | | | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| GRAMMAR | 916 | | 67.63 | | 28.83 | |
| WRITING | 916 | | 48.71 | | 34.98 | |
| COMPREHESION | 464 | | 38.23 | | 22.12 | |
| DICTIONARY USE | 464 | | 40.19 | | 44.03 | |
| TOTAL SCORE | 916 | | 50.83 | | 24.48 | |

| **2004 Arabic Language Test Scores of the 4th Grade Rural School Students** | | | | | | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| GRAMMAR | 432 | | 59.63 | | 31.94 | |
| WRITING | 432 | | 38.8 | | 34.72 | |
| COMPREHESION | 221 | | 31.3 | | 21.98 | |
| DICTIONARY USE | 221 | | 32.12 | | 42.74 | |
| TOTAL SCORE | 432 | | 41.88 | | 24.84 | |

And in mathematics:

**Math Test 3 (General Competency in Math Problem Solving) at the National Level**

| Competency | N | | Mean | | Std | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| TOTM3P | 417 | | 30.1 | | 16.8 | |
| NUMBERP | 417 | | 35.3 | | 18.4 | |
| GEOMETRP | 417 | | 17.8 | | 19.9 | |
| GEOSTE1P | 417 | | 18.1 | | 28.6 | |
| GEOSTE2P | 417 | | 17.7 | | 21.0 | |
| NUMSTE1P | 417 | | 48.4 | | 23.5 | |
| NUMSTE2P | 417 | | 25.5 | | 19.5 | |
| STEP1P | 417 | | 40.8 | | 22.3 | |
| STEP2P | 417 | | 21.4 | | 16.3 | |

| **Math Test 3 (Problem Solving) for Male Fourth Graders in 2004** | | | | | | |
|---|---|---|---|---|---|---|
| Competency | N | | Mean | | St. | |
| | **03** | **07** | **03** | **07** | **03** | **07** |
| TOTM3P | 217 | | 31.2 | | 16.2 | |
| NUMBERP | 217 | | 36.1 | | 18.2 | |
| GEOMETRP | 217 | | 19.7 | | 19.6 | |
| GEOSTE1P | 217 | | 21.0 | | 29.0 | |
| GEOSTE2P | 217 | | 19.0 | | 21.1 | |
| NUMSTE1P | 217 | | 49.0 | | 23.3 | |
| NUMSTE2P | 217 | | 26.4 | | 19.5 | |
| STEP1P | 217 | | 42.0 | | 22.0 | |
| STEP2P | 217 | | 22.5 | | 16.0 | |

**Math Test 3 (Problem Solving) for Female Fourth Graders in 2004**

| Competency | N | | Mean | | Std | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| TOTM3P | 200 | | 28.9 | | 17.4 | |
| NUMBERP | 200 | | 34.5 | | 18.6 | |
| GEOMETRP | 200 | | 15.9 | | 20.1 | |
| GEOSTE1P | 200 | | 15.0 | | 27.9 | |
| GEOSTE2P | 200 | | 16.3 | | 20.8 | |
| NUMSTE1P | 200 | | 47.8 | | 23.8 | |
| NUMSTE2P | 200 | | 24.6 | | 19.5 | |
| STEP1P | 200 | | 39.6 | | 22.5 | |
| STEP2P | 200 | | 20.1 | | 16.6 | |

**Math Test 3 (Problem Solving) for Urban School Grade 4 Student**

| Competency | N | | Mean | | Std | |
|---|---|---|---|---|---|---|
| | **03** | **07** | **03** | **07** | **03** | **07** |
| TOTM3P | 292 | | 30.8 | | 16.5 | |
| NUMBERP | 292 | | 36.0 | | 17.8 | |
| GEOMETRP | 292 | | 18.8 | | 20.0 | |
| GEOSTE1P | 292 | | 19.0 | | 28.5 | |
| GEOSTE2P | 292 | | 18.7 | | 21.4 | |
| NUMSTE1P | 292 | | 49.2 | | 23.6 | |
| NUMSTE2P | 292 | | 26.1 | | 18.8 | |
| STEP1P | 292 | | 41.7 | | 22.2 | |
| STEP2P | 292 | | 22.0 | | 16.2 | |

| Math Test 3 (Problem Solving) for the Rural School Grade 4 Student | | | | | | |
|---|---|---|---|---|---|---|
| Competency | N | | Mean | | Std | |
| | **03** | **07** | **03** | **07** | **03** | **07** |
| TOTM3P | 125 | | 28.3 | | 17.5 | |
| NUMBERP | 125 | | 33.7 | | 19.6 | |
| GEOMETRP | 125 | | 15.6 | | 19.5 | |
| GEOSTE1P | 125 | | 16.0 | | 28.8 | |
| GEOSTE2P | 125 | | 15.4 | | 19.9 | |
| NUMSTE1P | 125 | | 46.6 | | 23.3 | |
| NUMSTE2P | 125 | | 24.1 | | 20.9 | |
| STEP1P | 125 | | 39.0 | | 22.3 | |
| STEP2P | 125 | | 19.8 | | 16.6 | |

| Math Test 3 (Problem Solving) Scores of the MOE Grade 4 Students | | | | | | |
|---|---|---|---|---|---|---|
| Competency | N | | Mean | | Std | |
| | **03** | **07** | **03** | **07** | **03** | **07** |
| TOTM3P | 313 | | 28.57 | | 15.65 | |
| NUMBERP | 313 | | 33.87 | | 17.42 | |
| GEOMETRP | 313 | | 16.18 | | 18.31 | |
| GEOSTE1P | 313 | | 15.97 | | 27.15 | |
| GEOSTE2P | 313 | | 16.29 | | 19.71 | |
| NUMSTE1P | 313 | | 46.88 | | 22.85 | |
| NUMSTE2P | 313 | | 24.12 | | 18.94 | |
| STEP1P | 313 | | 39.15 | | 21.45 | |
| STEP2P | 313 | | 19.80 | | 15.40 | |

**Other revamped national assessment (by MOE)**

Data from the National Test, which is conducted by ministry of education, annually will be used as part of the baseline data on student achievement. The exam covered the following:

6 subjects for $10^{th}$ grade (10% or 9545 students)
2 subjects for $4^{th}$ grade (5% or 5773)
6 subjects for $8^{th}$ grade (5% or 5358)
Practical applications for $11^{th}$ Grade

For the baseline, performance data in languages (Arabic and English), mathematics and science will be used for the $4^{th}$, $8^{th}$, and $10^{th}$ grades.

**Arabic - 4th Grade**

Overall performance was 61% (with standard deviation of 20). The average performance for male students was 59% (std=20) and for females was 64% (std=19) but the difference was not statistically significant. The areas tested included:

Knowing and understanding

- Memorization
- Differentiating
- Explaining
- Conclusion
- Critical thinking
- Reasoning

Higher order thinking skills

- Enjoying text
- Conversion
- Construction of words

Performance by subject was as follows: The average in reading was 59%, in poems and songs was 73%, and in writing was 61%. Less than 50% of students answered the following items correctly:

- ability to construct sentence (6.4%)
- ability to explain words (24%)
- differentiating between words (12%)
- ability to use words to fit in text

**Math – 4th grade**

Performance in knowing and understanding was less than 57% and included:

- memorization
- reading and constructing table and graphs
- identifying and applying routine operations

Performance in higher order thinking items was 53% and included:

- Converting pictures and graphs to symbols
- Logic

Average overall performance was 56% (std=15) with 55% for males and 58% for females 58 and the difference was statistically significant in favor of females. Performance by topics was:

- in numbers and operations it was 59%
- in Geometry it was 55%
- in measurement it was 61%
- in algebra (fractions) it was 49%

Students faced difficulty in the following items:

- For numbers:
  - Factoring

- Subtraction (borrowing….)
- Series
- Real applications to math problems

- Geometry
  - Identifying points on a triangle
  - Identifying special features in a graph
  - Adding length of a triangle
- Fractions
  - Equal fractions
  - Fraction of a whole number
  - Ordering fractions
- Measurements
  - Identifying the time
  - Converting measurements

**Arabic – 8th Grade**

Lower order thinking skills

- Memorization
- Differentiating between items
- Control over the use of words
- Explaining meaning
- Understanding
- Conclusion
- Reasoning

Higher order thinking skills

- Understanding text in a poem or story line
- Converting words
- Constructing words

Subjects:

Overall the average was 56% (std=18). The average for male students was 53% (std=18) and for female was 6 0% (std= 18) but the difference was not statistically significant. Average by subject was:

- Reading (55%)
- Grammar (57%)
- Application (59%)

Lowest performance (more than 50% of students answered it correctly) was observed in the following items:

- Meanings (31%)
- Comprehension (36%)
- Using Arabic dictionary (36%)
- Recalling of information read (28%)

- In Grammar: Identifying verbs and words and its use (39% and 43%), grammar (30%), verbs and grammar (46%)
- In applications (using vowels -39%, spelling 46%)
- Writing 30%

**English – 8th grade**

Knowledge and understanding

- Knowing words (reading, writing and understanding meaning)
- Identifying the theme of a sentence

Using words

- Using language rules
- Using numbers
- Using English dictionary

Higher order thinking skills

- Criticizing text
- Finishing incomplete text

Subjects

Overall, the average was 45% (std=19), for males was 41% and 48% for females. In reading was 52%, writing 41%, making sentences was 40%, knowing words (49%), spelling was 47%, pronunciation 44%, numbering (44%), and using English dictionary was 45%. Poor performance was observed in the following areas:

- Verb tenses (28%)
- Phrasing questions (21%)
- Comparing adjectives and conditional sentences (29%, 33%)
- Reasoning (30%)

**Math – 8th Grade**
The average was 41% (with std. = 11), for males it was 41% and females 40%. In memorization it was 44%, 35% in higher order thinking skills, 54% in numbers, 46% in fractions, 37% in geometry, 36% in algebra, 41% in statistics, ratios (35% in relative comparisons).

**Science – 8th Grade**
The following skills were assessed:

- Knowing and understanding
  - Memorization
  - Using theories and numerical operations
  - Describing
  - Explanation of phenomena
- Higher order thinking skills
  - Searching for information, using, and presenting
  - Using theory in new situations and settings
  - Explaining
  - Conclusions and predictions

The average overall was 44% (std = 16.8, 42% for males and 45% females). The average in biology was 47%, 39% in physics, and 45% in chemistry and geology.

**Arabic – 10th grade**
Overall average was 49% (std=17). Areas in which less than 50% got it wrong were:

- Ordering words (average was (37%)
- Understanding text (45%)
- Mastering words (35%)
- Classifying text (38%)
- Explaining words (30%)
- Constructing new tenses (35%)
- Understanding meaning (22%)
- Extracting knowledge from text (39%)
- Deep understanding of text (32%)

In grammar the average was 38%, 48% in applications, and 47% in reading.

**English – 10th grade**
The overall average was 42% (std=17) and females (46%) were significantly ahead of males (39%). The average in using dictionary was 47%, 48% in numeration, 33% was altajzea, words 43% (choosing between words 22%), building phrases 37%, writing 41%, reading 47%, grammar 26%, reporting speech 31%, using verb tenses 30%, and understanding the conclusion of a text was 28%.

**Math – 10th grade**

Overall 40% (with std. of 16), 43% for males and 46% for females. Performance by topic was as follows:

Numbers 47%
Fractions 44%
Sets 38%
Measurement 27%
Geometry 37%
Algebra (42%)
Statistics 44%
Ratios (39%)
Shapes 50%
Algebra 39% (polynomials)
Problem solving and critical thinking 29%
Charts and graphs 45%

**Science 10th grade**

The overall average was 44.8% (std=16.6) and by topic was:

Biology 49%
Physics (47%)
Chemistry and Geology 38%

Summary of overall performance in the National Assessment

| Grade/Subject | Performance | 4th Grade | | 8th Grade | | 10th Grade | |
|---|---|---|---|---|---|---|---|
| | | **03** | **07*** | **03** | **07** | **03** | **07** |
| Arabic | Average | 62% | | 56% | | 49% | |
| | Lower order thinking skills | 61% | | 56% | | 46% | |
| | Higher order thinking skills | 57% | | 59% | | 40% | |
| | | | | | | | |
| English | Average | | | 45% | | 42% | |
| | Lower order thinking skills | | | 48% | | 44% | |
| | Higher order thinking skills | | | 41% | | 40% | |
| | | | | | | | |
| Math | Average | 56% | | 41% | | 40% | |
| | Lower order thinking skills | 57% | | 44% | | 45% | |
| | Higher order thinking skills | 53% | | 35% | | 29% | |
| | | | | | | | |
| Science | Average | | | 44% | | 45% | |
| | Lower order thinking skills | | | 46% | | 46% | |
| | Higher order thinking skills | | | 38% | | 41% | |
| * not conducted after 2004 | | | | | | | |

**Appendix II: International benchmarks in mathematics and science**

| **Levels of Mathematics and Science** | | |
|---|---|---|
| | **Mathematics** | **Science** |
| **Lowest International Benchmark** | *Students have some basic mathematical knowledge.* | *Students recognize some basic facts from the life and physical sciences.* They have some knowledge of the human body and heredity, and demonstrate familiarity with some everyday and demonstrate familiarity with some everyday heredity physical phenomena. Students can interpret some pictorial diagrams and apply knowledge of simple physical concepts to practical situations. |
| **Intermediate International Benchmark** | *Students can apply basic mathematical knowledge in straightforward situations.* They can add, subtract, or multiply to solve one-step word problems involving whole numbers and decimals. They can identify representations of common fractions and relative sizes of fractions. They understand simple algebraic relationships and solve linear equations with one variable. They demonstrate understanding of properties of triangles and basic geometric concepts including symmetry and rotation. They recognize basic notions of probability. They can read and interpret graphs, tables, maps, and scales. | *Students can recognize and communicate basic scientific knowledge across a range of topics.* They recognize some characteristics of the solar system, water cycle, animals, and human health. They are acquainted with some aspects of energy, force and motion, light reflection, and sound force and motion, light reflection, and sound energy. Students demonstrate elementary knowledge of human impact on and changes in the environment. They can apply and briefly communicate knowledge, extract tabular information, extrapolate from data presented in a simple linear graph, and interpret pictorial diagrams. |
| **High International Benchmark** | *Students can apply their understanding and knowledge in a wide variety of relatively complex situations.* They can order, relate, and compute with fractions and decimals to relate, and compute with fractions and decimals to order solve word problems, operate with negative integers, and solve multi-step word problems involving proportions with whole | *Students demonstrate conceptual understanding of some science cycles, systems, and principles.* They have some understanding of Earth's processes and the solar system, biological systems, populations, reproduction and heredity, and structure and function of organisms. The structure and function of organisms. The heredity show some understanding of physical and chemical changes, and the structure of |

| | | |
|---|---|---|
| | numbers. Students can solve simple algebraic problems including evaluating expressions, solving simultaneous linear equations, and using a formula to determine the value of a variable. Students can find areas and volumes of simple geometric shapes and use knowledge of geometric properties to solve problems. They can solve probability problems and interpret data in a variety of graphs and tables. | matter. They solve some basic physics problems related to light, heat, electricity, and magnetism, and they demonstrate basic knowledge of major environmental issues. They demonstrate some scientific inquiry skills. They can combine information to draw conclusions; interpret information in diagrams, graphs and tables to solve problems; and provide short explanations conveying scientific knowledge and cause/effect relationships. |
| **Advanced International Benchmark** | *Students can organize information, make generalizations, solve non-routine problems, problems and draw and justify conclusions from data.* They can compute percent change and apply their knowledge of numeric and algebraic concepts and relationships to solve problems. Students can solve simultaneous linear equations and model simple situations algebraically. They can apply their knowledge of measurement and geometry in complex problem situations. They can interpret data from a variety of tables and graphs, including interpolation and extrapolation. | *Students demonstrate a grasp of some complex and abstract science concepts.* They can apply knowledge of the solar system and of Earth features, processes, and conditions, and apply understanding of the complexity of living organisms and how they relate to their environment. They show understanding of electricity, thermal expansion, and sound, as well as the structure thermal expansion, and sound, as well as the structure electricity of matter and physical and chemical properties and changes. They show understanding of environmental and resource issues. Students understand some fundamentals of scientific investigation and can apply basic physical principles to solve some quantitative problems. They can provide written explanations to communicate scientific knowledge. |