

The Hashemite Kingdom of Jordan



The National Center for Human Resources Development

Jordanian National Report on the Trends in Mathematics and Science Study (TIMSS) 2011

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Preface

The International Study on the “Trends in Mathematics and Science Study 2011” for the assessment of students’ achievement in grades four and eight was implemented with the supervision of the International Association for the Evaluation of Educational Achievement (IEA) in Amsterdam / Netherland. (45) countries participated in the study, (11) of which are the following Arab countries: Jordan, Palestine, Lebanon, Tunisia, Morocco, Qatar, Syria, Bahrain, Oman, Saudi Arabia, and the United Arab Emirates. Moreover, (7694) Jordanian students participated in this study.

The National Center for Human Resources Development is pleased to present this report for the policy makers , and stakeholders to provide an excellent database that would need more research investigation to identify the school factors affecting students’ achievement in Math and Science.

The National Center for Human Resources Development invites the university professors and researchers in Jordan to conduct more research on this data to contribute to the development of Math and Science curricula, teachers’ preparation programs, and the improvement of the school environment to improve students’ achievement levels.

President

Prof. Dr. Abdullah Ababneh

Acknowledgment

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Finally, the team would like to thank our colleagues in the National Center for Human Resources Development for providing helpful notes, and consultations that contributed to the release of this report, particularly, Miss Manal Abdel Samad for analyzing the study's data, and Mrs, Shorouq Zawati for printing this report several times.

Jordanian National Report on the Trends in Mathematics and Science Study (TIMSS) 2011

Abstract

A sample of grade eight students in Jordan was selected from public schools, private schools, and UNRWA schools to participate in the International Study of Mathematics and Science\2011. Students from grade eight in (45) countries participated in TIMSS eight grade.

The participating Arab countries are: Jordan, Palestine, Lebanon, Tunisia, Morocco, Qatar, Syria, Bahrain, Oman, Saudi Arabia, and the United Arab Emirates. The Islamic countries are: Turkey, Iran, and Malaysia.

The Science items covered the following areas: geology, biology, physics, and chemistry. The Math questions covered the following areas: Numbers, data representation, geometry, and algebra. The general results of every test for each country were extracted for the test as a whole as well as for its sub-domains.

Regarding the science test, Jordanian students performed better than the Math test. Jordan ranked (28) among the participating countries. The performance average in science for Jordanian students was (449) compared to the international average which is (477), and the highest country which was Singapore with an average of (590), and the lowest country which was Ghana with an average of (306). This means that the performance average of the Jordanian students is (28) scores less than the international average, which is statistically significant at ($\alpha = 0.05$). At the Arab countries level, Jordan ranked third, and the Jordanian students' performance average in science was higher than the Arab average, which is (428) with statistical significance.

With regard to the performance averages in the four sub domains of the test were as follows: Geology (446), Biology (447), Physics (446), Chemistry (463), and all are below the international average which is (477).

Regarding the Jordanian students' results in the Math test, the performance average in math was (406) scores, noting that the overall average for all participating countries was (467), the highest country was Korea with an average of (613) scores, while the lowest country was Ghana with an average of (331) scores.

The performance average in Math for the Jordanian students was below the international average with statistical significance, as Jordan ranked (35) at the international level and (6) at the Arab level. The results of the study showed that there is difference in the Jordanian students' achievement in Math and Science in 2011 and 2007, for the favor of 2007, as the

decline was (33) scores in science and (21) scores in Math. This is considered a serious issue affecting the educational system and need to be addressed by educators, politicians, decision-makers, policy-makers and the society as a whole so that this decline comes to an end. Moreover, there is need to upgrade students' achievement to reach the international levels, so that they can obtain a privileged position in a highly competitive world.

The results of the study showed that females were out performed male in Science and Math in all of the study's rounds in 1999, 2003, 2007, and 2011. Moreover, the results of the study showed that students in private schools were out performed students in public schools, as and that students in urban areas were out performed students in rural areas.

In sum, public schools are invited to benefit from the experiences of private schools to upgrade the level of education up to the private schools levels. However, private schools need to sustain their achievements and make more improvements to enhance the performance levels of their students.

On the other side, there is urgent need to give more attention for the males' school, as well as school in rural areas to improve the performance of students, and to realize equity between male and female students, and between rural and urban students.

Jordanian National Report on TIMSS 2011 Study

Executive summary

A sample of 8th grade Jordanian students participated in the Trends in International Mathematics and Science Study in the cycle of 2011 (TIMSS 2011) and the sample was selected from the MoE schools, private schools, and UNRWA schools. 45 countries participated in the study including Jordan. The set of Arab countries who participated in the study were: Jordan, Tunisia, Morocco, Bahrain, Saudi Arabia, Qatar, Oman, Syria, Lebanon, Palestine and the United Arab Emirates. The Islamic countries who participated in the study were: Turkey, Iran, and Malaysia.

The Science items covered the following content domains: Physics, Biology, Chemistry and Earth Science, while the Mathematics items covered the following content domains: Number, Algebra, Geometry and Data & probability. Moreover, the cognitive domains for both subjects were knowledge, Application and Reasoning and the performance of all countries was reported by subject, content domains & cognitive domains.

Jordan ranked 28 among the participating countries in science as its average performance is (449), while the international average is (477). The highest average is (590) for Singapore, & the lowest average is (306) for Ghana. Jordan ranked 3rd among the Arab countries, and its average in science is significantly higher than the Arab Average which is (428). Jordan's averages by content domain are as follows: Earth Science (446), Biology (447), Physics (446), and Chemistry (463), all of which are below the international average which is (477).

Jordan ranked 35 among the participating countries in Mathematics. The average performance in Mathematics for Jordan is (406), while the international average is (467). The highest average is (613) for Korea & the lowest average is (331) for Ghana. Jordan ranked 6th among the Arab countries in Mathematics and its average & the Arab average are not significantly different. Jordan's averages by content domains were as follows: Number (390), Algebra (432), Geometry (407) and Data & probability (379).

The results of the study showed a substantial decline in the performance of Jordanian students in: Math & Science in 2011 compared to the previous cycle in 2007. The magnitude of the decline was (21) scores in Mathematics and (33) scores in Science. The results also indicated the disparities in student performance by gender, location, and school authority across all cycles of the study in 1999, 2003, 2007, and 2011, and the proposed decline factors were discussed.

Educators, policy makers and planners and the whole society at large are invited to exert all efforts to address such decline and take all necessary actions to improve the quality of our educational system.

The study recommends that further studies need to be conducted to reveal the proposed factors of gaps & disparities in students' performance as well as raising the level of awareness on the importance of the study to improve students' performance in the next cycle of the study in 2015.

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Chapter One

Study's Description and Procedures

"Trends in International Mathematics and Science Study" (TIMSS 2011)

Educational research has been interested in conducting international studies since the early sixties with the aim of comparing students' achievement trends and levels all over the world, as well as discussing the factors affecting students' achievement and trends.

International studies enable the participating countries to better understand educational systems and help educational decision and policy makers identify valid and realistic standards of the educational achievement or performance to help monitor and evaluate the successes or failures of their educational systems.

International comparative studies on education expand the expertise of the participating countries to improve their national studies in terms of measurement and evaluation of the educational achievement. These studies also enhance the confidence to disseminate studies that explain the factors affecting achievement in education, and generate new ideas contributing to improving the design and management of schools and classes. Moreover, such studies highlight new dimensions in the educational research in the participating countries, as well as providing objective non-biased study and assessment for educational innovations implemented through educational development plans and programs. This would enable these countries to avoid the shortcomings of these programs and to develop remedial plans to improve the performance of the educational systems.

The "trends in International Mathematics and Science study," carried out in 2011, is the latest study of a series of International evaluation studies. This study was implemented in (45) countries, including 11 Arab countries. This study aims at improving teaching and learning in math and science by providing data on student achievement in educational systems with varied instructional practices and school environments.

International Study of Math and Science was administered in 2003 /2007/2011 for grades eight and four. In 1999, the study was administered for grade eight only, and in 1995, it was administered for grades eight, four and the final grade. Therefore, this study allows countries that have previously participated in the study, to measure the changes in their students' achievement.

Jordan participated in the study in 1999, as well as in 2003, 2007 and 2011. This report discusses in details the comparison of Jordanian students' performance levels in 1999, 2003, 2007, and 2011. The report also describes the performance levels in math and science in 2011, by the variables of gender (male, female), supervising authority (Ministry of Education, UNRWA, and private education), school location (urban, rural) ,and by the strata of the study sample (discovery schools / Ministry of Education, Madrasati / Ministry of Education, Ministry of

Education, UNRWA, Private Education, Education Reform Support Project (ERSP)/ Ministry of Education).

And before describing the study, we will provide a historical overview about the Jordan participation in some international studies.

The International Assessment of Educational Progress (IAEP)

The first international study to assess students at age (13) in science and math was conducted in 1988. The following six countries participated in the study: Canada, Ireland, Korea, Spain, United Kingdom, and the United States of America. The Second International Assessment of Educational Progress (IAEP) was conducted in 1991. This study included assessment of student achievement at the age of (9) years in science and math, as well as assessment of student at the age of (13) in science, math and geography. Jordan, along with nineteen countries, participated in the part of the assessment of students at the age of (13) in science and math. The participating countries were: Korea, Mozambique, Portugal, Scotland, the Soviet Union (13 Republics only), Spain, Switzerland (14 cantons only), Taiwan, Yugoslavia (Slovenia only), China (20 provinces only), England, France, Hungary, Ireland, Israel, Italy, Brazil, Canada (nine regions), and the United States of America. It should be noted that the American Center for Educational Testing Service (ETS) supervised the first and second studies.

The Second International Study for Educational Progress aimed to compare student achievement in science and math in countries that vary in their cultural, economic, social and educational conditions to determine the impact of some factors related to the environment, school, home, and the educational environment on the achievement in science and math.

The number of Jordanian students participating in the study was (3168) students distributed as follows: (1588) in sciences (1580) in math.

Third International Study of Mathematics and Science in 1995

Third International Study of Math and Science is the largest global study conducted so far with the aim of measuring students' achievement in math and science. The study was supervised by the International Association for the Evaluation of Educational Achievement and conducted by Boston College. This study was implemented for the third time in 1995 in more than 40 countries to measure the achievement of students at the age of 9 (mostly in grades 3 and 4), students at the age of (13), (mostly in grades 7 and 8) and students in the final grade of the secondary school. Students were tested in math and science, and comprehensive information on the teaching and learning of math and science was collected from students, teachers and school principals. The number of tested students was more than half a million students, and questionnaires were distributed to thousands of teachers and principals.

The number of math items was (151) item covering the following math contents: numbers, algebra, measurement, geometry, and data representation and probability, and proportionality. The test measured the following mental skills: knowledge, simple routine procedures, complex and routine procedures, and problem solving. About (80%) of the test items were of the

multiple choice type, while other items (20%) were open question where students are required to form answers and write them down in a particular space, noting that most of these questions require short answers and others require long ones.

Sciences items included (135), covering the following contents: earth sciences, biology, physics, chemistry, the environment, and the nature of science. The following mental skills were measured: "understanding," "analysis and forming theories and solving problems", "the use of tools, routine procedures and scientific processes" and "exploring the natural world."

Math and science items were distributed in eight booklets, each includes math and science items and students have to answer one booklet. The total time for answering any of the eight booklets was (90) minutes.

Table (1) shows the performance averages of the countries participating in the "Third International Math and Science (TIMSS)/1995 for students in grades (7 and 8). Raw scores were transformed using a new scale of an average of (500) and of standard deviation of (100).

Table (1) shows that the countries with the top three ranks, by the performance average of grade (8) students in math are: Singapore, then Korea, followed by Japan. These countries have maintained the same order at grade (7) students. The performance of grade (8) students in Thailand and Israel was a Median of the performances of all nations. The countries that ranked at end of the list are: Iran (38), Kuwait (39), Columbia (40), and South Africa ranked (41).

The situation in science is somehow similar to math, as Singapore ranked first in grades (7) and (8), and South Africa ranked last. Iran ranked (37), while Kuwait ranked (39).

Table (1)

Performance Average of the Participating Countries in 1995 in the third International Study on "Trends in Science and Math (TIMSS)" for Students in Grades Seven and Eight

| Math | | | | Science | | | |
|----------------|---------|--------------|---------|--------------|---------|---------------|---------|
| Grade Eight | | Grade Seven | | Grade Eight | | Grade Seven | |
| Country | Average | Country | Average | Country | Average | Country | Average |
| Singapore | 643 | Singapore | 601 | Singapore | 607 | Singapore | 545 |
| Korea | 607 | Korea | 577 | Czech | 574 | Korea | 535 |
| Japan | 605 | Japan | 571 | Japan | 571 | Czech | 533 |
| Hong Kong | 588 | Hong Kong | 564 | Korea | 565 | Japan | 531 |
| Belgium (Fl) | 565 | Belgium (Fl) | 558 | Bulgaria | 565 | Bulgaria | 531 |
| Czechoslovakia | 574 | Netherlands | 516 | Slovenia | 560 | Belgium (Fl) | 529 |
| Switzerland | 545 | Bulgaria | 514 | Austria | 558 | Austria | 519 |
| Netherlands | 541 | Austria | 509 | Hungary | 554 | Hungary | 518 |
| Slovenia | 541 | Slovak | 508 | Britain | 552 | Netherlands | 518 |
| Bulgaria | 540 | Belgium (Fr) | 507 | Belgium (Fl) | 550 | Britain | 512 |
| Austria | 539 | Switzerland | 506 | Australia | 545 | Slovakia | 510 |
| France | 538 | Hungary | 502 | Slovakia | 544 | United States | 508 |
| Hungary | 537 | Russia | 501 | Russia | 538 | Australia | 504 |
| Russia | 535 | Ireland | 500 | Ireland | 538 | Germany | 499 |

| | | | | | | | |
|------------------------------|------------|---------------|------------|---------------|------------|--------------|------------|
| Australia | 530 | Slovenia | 498 | Sweden | 535 | Canada | 499 |
| Ireland | 527 | Australia | 498 | United States | 534 | Hong Kong | 495 |
| Canada | 527 | Thailand | 495 | Germany | 531 | Ireland | 495 |
| Belgium (Fr) | 526 | Canada | 494 | Canada | 531 | Thailand | 493 |
| Thailand | 522 | France | 492 | Norway | 527 | Sweden | 488 |
| Israel | 522 | Germany | 484 | New Zealand | 525 | Switzerland | 484 |
| Germany | 509 | Britain | 476 | Israel | 524 | Norway | 483 |
| New Zealand | 508 | United States | 476 | Hong Kong | 522 | New Zealand | 481 |
| Britain | 506 | New Zealand | 472 | Switzerland | 522 | Spain | 477 |
| Norway | 503 | Denmark | 465 | Scotland | 517 | Scotland | 468 |
| Denmark | 502 | Scotland | 463 | Spain | 517 | Iceland | 462 |
| United States | 500 | Latvia (LSS) | 462 | France | 498 | Romania | 452 |
| Scotland | 498 | Norway | 461 | Greece | 497 | France | 451 |
| Latvia (LSS) | 493 | Iceland | 459 | Iceland | 494 | Greece | 449 |
| Spain | 487 | Romania | 454 | Romania | 486 | Belgium (Fr) | 442 |
| Iceland | 487 | Spain | 448 | Latvia (LSS) | 485 | Denmark | 439 |
| Greece | 484 | Cyprus | 446 | Portugal | 480 | Iran | 436 |
| Romania | 482 | Greece | 440 | Denmark | 478 | Latvia | 435 |
| Lithuania | 477 | Lithuania | 428 | Lithuania | 476 | Portugal | 428 |
| Cyprus | 474 | Portugal | 423 | Belgium (Fr) | 471 | Cyprus | 420 |
| Portugal | 454 | Iran | 401 | Iran | 470 | Lithuania | 403 |
| Iran | 428 | Columbia | 469 | Cyprus | 463 | Columbia | 387 |
| Kuwait | 392 | South Africa | 348 | Kuwait | 430 | South Africa | 317 |
| Columbia | 385 | | | Columbia | 411 | | |
| South Africa | 354 | | | South Africa | 326 | | |
| International Average | 513 | | 484 | | 516 | | 479 |

The Sciences test consisted of (72) items , covering the contents of the natural sciences, and earth and space sciences, biology, and the nature of science. The items were distributed on the skills dealing with facts and scientific concepts and principles, and the students' use of concepts and scientific principles to solve simple problems, as well as the integration of scientific concepts and principles to solve complex problems.

Furthermore, the math test consisted of (76) items covering five key math topics: numbers and operations, measurement, geometry, data analysis, and algebra. The items were distributed on three types of skills which are: understanding concepts, the use of procedural knowledge, solving mathematical problems.

The results of the study indicated that the level of performance of Jordanian students in science was low, with an average percentage of correct answers of (57%). The performance of Jordanian students ranked before the last between Portugal (63%) and Brazil (52%). Besides, Jordanian student performance, on average, was significantly low compared to students' performance among the participating countries, with difference amounting to (10.5%) and much more noticeably low compared to the student's performance in the first ranking three countries: Korea (21% difference), Taiwan (19% difference), and Switzerland (17% difference).

Results showed that Jordanian students' performance slightly varies among the four content domains covered by the test, and significantly varies among the cognitive skills measured by the

test. The best performance was in earth and space sciences, and the skill of knowledge of facts, concepts and scientific principles. The worst performance was in the nature of science and in the skill of integrating knowledge in resolving complex problems. It should be noted that Jordanian students' performance in all content areas and in all cognitive skills was in the penultimate rank, just ahead of Brazil. In addition, the difference between the Jordan's performance average on one hand, and Israel, Italy and Slovenia average was (13%).

The study's results showed that the level of Jordanian students' performance in math compared with the students' performance of all participating countries was also low where the average of percentages of the correct answers in math was (40%), Jordanian students' performance in math ranked eighteenth out of twenty countries participating in math test. Mozambique ranked last with an average percentages of (28%), topped by Brazil with an average percentages of (37%). The average of Jordanian students' performance was significantly low compared to the performance average of student in the participating countries with a difference of (20%). In addition, Jordanian students' performance was very markedly low when compared with the average of students' performance in China, which ranked first with a difference of (40%). Students' performance differed by math content as it was the best in the domain of data analysis (46%), followed by geometry (44%), while the worst was in measurement (32%). For the cognitive skills, the performance was the best in conceptual understanding (45%), while it was the worst in solving mathematical problems (38%), and their performance in procedural knowledge was the same as in solving mathematical problems.

Third International Mathematics and science study Repoeated (TIMSS – R)

The results of the "Third International Math and Science Study / 1995" have significant impacts in the education sectors many participating countries, as they raised national dialogues and have been translated into education development plans in many of these countries.

As the performance levels of students in the participating countries in 1995 were seen as recent data and so; some of these countries were interested in re-conducting this study. This offered Jordan with an opportunity for participating in the third study. It is worth mentioning that the study is repeated every four years, as it allowing the participating countries to monitor and evaluate the performance of their educational systems and compare it with the other countries of the world.

The "Third International Math and Science Study / 1995" was conducted again in 1998/1999 for grade (8) students (the test was implemented in Jordan in May /1999). Students were tested in math and science, and responded to a questionnaire on their classroom experiences, their attitudes towards math and science, and their family backgrounds. Teachers responded to a questionnaire on their academic preparation, their teaching practices, and their perspectives on many issues related to the teaching of math and science. In addition to that, school principals responded to the school questionnaire and provided information on the schools in terms of characteristics and resources.

The three Arab countries participating in the study are Jordan, Morocco, and Tunisia, while these countries did not participated in the previous study conducted in 1995.

Table (2) shows the performance average of the participating countries in science, and table (3) shows the performance average in math. These tables show that Jordan's performance in math and science was below the international average, as Jordan ranked (30) in science, and (32) in math.

Table (2)

The Performance Average of the Participating Countries in 1999 in the third International Study on "Trends in Science and Math (TIMSS)" in Science/ (Repeated)

| Science | | |
|---------|---------------|---------|
| Rank | Country | Average |
| 1 | Taiwan | 569 |
| 2 | Singapore | 568 |
| 3 | Hungary | 552 |
| 4 | Japan | 550 |
| 5 | Korea | 549 |
| 6 | Netherlands | 545 |
| 7 | Australia | 540 |
| 8 | Czech | 539 |
| 9 | Britain | 538 |
| 10 | Finland | 535 |
| 10 | Slovakia | 535 |
| 10 | Belgium | 535 |
| 13 | Slovenia | 533 |
| 13 | Canada | 533 |
| 15 | Hong Kong | 530 |
| 16 | Russia | 529 |
| 17 | Bulgaria | 518 |
| 18 | United States | 515 |
| 19 | New Zealand | 510 |
| 20 | Latvia | 503 |
| 21 | Italy | 493 |
| 22 | Malaysia | 492 |
| 23 | Lithuania | 488 |

| | | |
|----|-----------------------|-----|
| 24 | Thailand | 482 |
| 25 | Romania | 472 |
| 26 | Israel | 468 |
| 27 | Cyprus | 460 |
| 28 | Moldova | 459 |
| 29 | Macedonia | 458 |
| 30 | Jordan | 450 |
| 31 | Iran | 448 |
| 32 | Indonesia | 435 |
| 33 | Turkey | 433 |
| 34 | Tunisia | 428 |
| 35 | Chile | 420 |
| 36 | Philippines | 345 |
| 37 | Morocco | 323 |
| 38 | South Africa | 243 |
| | | |
| | International Average | 488 |

| | |
|--------------------------------------|--|
| Average higher than Jordan's Average | |
| Average similar to Jordan's Average | |
| Average lower than Jordan's Average | |

Table (3)

The Performance Average of the Participating Countries in 1999 in the third International Study on “Trends in Science and Math (TIMSS)” in Math / (Repeated)

| Math | | |
|-------------|----------------|----------------|
| Rank | Country | Average |
| 1 | Singapore | 604 |
| 2 | Korea | 587 |
| 3 | Taiwan | 585 |
| 4 | Hong Kong | 582 |
| 5 | Japan | 579 |
| 6 | Belgium | 558 |
| 7 | Netherlands | 540 |
| 8 | Slovakia | 534 |
| 9 | Hungary | 532 |
| 10 | Canada | 531 |
| 11 | Slovenia | 530 |
| 12 | Russia | 526 |
| 13 | Australia | 525 |
| 14 | Malaysia | 520 |
| 14 | Finland | 520 |
| 16 | Czech | 519 |
| 17 | Bulgaria | 511 |
| 18 | Latvia | 505 |
| 19 | United States | 502 |
| 20 | Britain | 496 |

| | | |
|----|------------------------------|-----|
| 21 | New Zealand | 491 |
| 22 | Lithuania | 482 |
| 23 | Italy | 479 |
| 24 | Cyprus | 476 |
| 25 | Romania | 472 |
| 26 | Thailand | 469 |
| 27 | Moldova | 467 |
| 28 | Israel | 466 |
| 29 | Tunisia | 448 |
| 30 | Macedonia | 447 |
| 31 | Turkey | 429 |
| 32 | Jordan | 428 |
| 33 | Iran | 422 |
| 34 | Indonesia | 403 |
| 35 | Chile | 392 |
| 36 | Alpson | 345 |
| 37 | Morocco | 337 |
| 38 | South Africa | 275 |
| | International average | 487 |

| | |
|---|--|
| Average higher than Jordan's Average | |
| Average similar to Jordan's Average | |
| Average lower than Jordan's Average | |

"Trends in International Math and Science Study"(TIMSS 2003)

The study was carried out in (46) countries, including (9) Arab countries with the aim of improve teaching and learning in math and science.

Table (4) shows the performance average of participating countries in science, and Table (5) shows the performance average of participating countries in math. Jordan's performance average in Science was (475), and in math was (424), and Jordan ranked (26) in science and (33) in math.

Table (4)

The Performance Average of the Participating Countries in TIMSS2003 in Science

| Country | | Average | | Country | | Average | |
|-----------------------|---------------|---------|---|---------|-----------------------|---------|---|
| 1- | Singapore | 578 | Δ | 24- | Israel | 488 | |
| 2- | Taiwan | 571 | Δ | 25- | Bulgaria | 479 | |
| 3- | Taiwan | 558 | Δ | 26- | Jordan | 475 | |
| 4- | Korea | 556 | Δ | 27- | Moldova | 472 | |
| 5- | Hong Kong | 552 | Δ | 28- | Romania | 470 | |
| 6- | Estonia | 552 | Δ | 29- | Serbia | 468 | ▽ |
| 7- | Japan | 544 | Δ | 30- | Armenia | 461 | ▽ |
| 8- | Britain | 543 | Δ | 31- | Iran | 453 | ▽ |
| 9- | Hungary | 536 | Δ | 32- | Macedonia | 449 | ▽ |
| 10- | Netherlands | 527 | Δ | 33- | Cyprus | 441 | ▽ |
| 11- | United States | 527 | Δ | 34- | Bahrain | 438 | ▽ |
| 12- | Australia | 524 | Δ | 35- | Palestinian Authority | 435 | ▽ |
| 13- | Sweden | 520 | Δ | 36- | Egypt | 421 | ▽ |
| 13- | Slovenia | 520 | Δ | 37- | Indonesia | 420 | ▽ |
| 15- | New Zealand | 519 | Δ | 38- | Chile | 413 | ▽ |
| 16- | Lithuania | 517 | Δ | 39- | Tunisia | 404 | ▽ |
| 17- | Belgium | 516 | Δ | 40- | Saudi Arabia | 398 | ▽ |
| 18- | Russia | 514 | Δ | 41- | Morocco | 396 | ▽ |
| 19- | Latvia | 512 | Δ | 42- | Lebanon | 393 | ▽ |
| 19- | Scotland | 512 | Δ | 43- | Philippines | 377 | ▽ |
| 21- | Malaysia | 510 | Δ | 44- | Botswana | 365 | ▽ |
| 22- | Norway | 494 | Δ | 45- | Ghana | 255 | ▽ |
| 23- | Italy | 491 | Δ | 46- | South Africa | 244 | ▽ |
| International Average | | 474 | | | | | |

| | |
|--------------------------------------|---|
| Average higher than Jordan's Average | Δ |
| Average similar to Jordan's Average | |
| Average lower than Jordan's Average | ▽ |

Table (5)

The Performance Average of the Participating Countries in TIMSS 2003 in Math

| Country | Average | | Country | Average | |
|------------------------------|---------|---|--------------|------------|-----|
| Singapore | 605 | Δ | Armenia | Δ | 478 |
| Korea | 589 | Δ | Serbia | Δ | 477 |
| Hong Kong | 586 | Δ | Bulgaria | Δ | 476 |
| Taiwan | 585 | Δ | Romania | - | 475 |
| Japan | 570 | Δ | Norway | ▽ | 461 |
| Belgium | 537 | Δ | Moldova | - | 460 |
| Netherlands | 536 | Δ | Cyprus | ▽ | 459 |
| Estonia | 531 | Δ | Macedonia | ▽ | 435 |
| Hungary | 529 | Δ | Lebanon | ▽ | 433 |
| Malaysia | 508 | Δ | Jordan | ▽ | 424 |
| Latvia | 508 | Δ | Iran | ▽ | 411 |
| Russia | 508 | Δ | Indonesia | ▽ | 411 |
| Slovakia | 508 | Δ | Tunisia | ▽ | 410 |
| Australia | 505 | Δ | Egypt | ▽ | 406 |
| United States | 504 | Δ | Bahrain | ▽ | 401 |
| Lithuania | 502 | Δ | PA | ▽ | 390 |
| Sweden | 499 | Δ | Chile | ▽ | 387 |
| Scotland | 498 | Δ | Morocco | ▽ | 387 |
| Britain | 498 | Δ | Philippines | ▽ | 378 |
| Israel | 496 | Δ | Botswana | ▽ | 366 |
| New Zealand | 494 | Δ | Saudi Arabia | ▽ | 332 |
| Slovenia | 493 | Δ | Ghana | ▽ | 276 |
| Italy | 484 | Δ | South Africa | ▽ | 264 |
| International Average | | | | 467 | |

| | |
|--------------------------------------|---|
| Average higher than Jordan's Average | Δ |
| Average similar to Jordan's Average | |
| Average lower than Jordan's Average | ▽ |

Trends in International Math and Science Study" (TIMSS 2007)

The study was carried out in (49) countries, including (12) Arab countries. Tables (6) and (7) show the performance average of the participating countries in science and math. The

performance average of Jordanian students in Science was (482), and in math was (427). Jordan ranked (20) in science and (31) in math.

Table (6)

The Performance Average of the Participating Countries in TIMSS 2007 in Science

| Country | | Average | Country | | Average |
|---------|------------------------------|------------|-----------------------------|------------------------|---------|
| 1 | Singapore | 567 | 29 | Iran | 459 |
| 2 | Taiwan | 561 | 30 | Malta | 457 |
| 3 | Japan | 554 | 31 | Turkey | 454 |
| 4 | Korea | 553 | 32 | Syria | 452 |
| 5 | England | 541 | 32 | Cyprus | 452 |
| 6 | Hungary | 539 | 34 | Tunisia | 445 |
| 6 | Czech | 539 | 35 | Indonesia | 427 |
| 8 | Slovenia | 538 | 36 | Oman | 423 |
| 9 | Hong Kong | 530 | 37 | Georgia | 421 |
| 9 | Russia | 530 | 38 | Kuwait | 418 |
| 11 | The United States | 520 | 39 | Columbia | 417 |
| 12 | Lithuania | 519 | 40 | Lebanon | 414 |
| 13 | Austria | 515 | 41 | Egypt | 408 |
| 14 | Sweden | 511 | 41 | Algeria | 408 |
| 15 | Scotland | 496 | 43 | Palestine | 404 |
| 16 | Italy | 495 | 44 | Saudi Arabia | 403 |
| 17 | Armenia | 488 | 45 | Morocco | 402 |
| 18 | Norway | 487 | 46 | El Salvador | 387 |
| 19 | Ukraine | 485 | 47 | Botswana | 355 |
| 20 | Jordan | 482 | 48 | Qatar | 319 |
| 21 | Malaysia | 471 | 49 | Ghana | 303 |
| 21 | Thailand | 471 | Other participations | | |
| 23 | Serbia | 470 | | Massachusetts / USA | 556 |
| 23 | Bulgaria | 470 | | Minnesota / USA | 539 |
| 25 | Bahrain | 467 | | Ontario / Canada | 526 |
| ■ | International Average | 466 | | Columbia / Canada | 526 |
| 26 | Bosnia and | 466 | | Quebec / Canada | 507 |
| 27 | Israel | 465 | | Basque Country / Spain | 498 |
| 28 | Romania | 462 | | Dubai / United Arab | 489 |

| | |
|--------------------------------------|---|
| Average higher than Jordan's Average | Δ |
| Average similar to Jordan's Average | |
| Average lower than Jordan's Average | ▽ |

Table (7)

The Performance Average of the Participating Countries in TIMSS 2007 in Math

| | Country | Average | | Country | Average |
|----------------------|-------------------------|---------|----|---------------------------|---------|
| 1 | Taiwan | 598 | 25 | Israel | 461 |
| 2 | Korea | 597 | ■ | The international average | 451 |
| 3 | Singapore | 593 | 27 | Bosnia and Herzegovina | 456 |
| 4 | Hong Kong | 572 | 28 | Lebanon | 449 |
| 5 | Japan | 570 | 29 | Thailand | 441 |
| 6 | Hungary | 517 | 30 | Turkey | 432 |
| 7 | England | 513 | 31 | Jordan | 427 |
| 8 | Russia | 512 | 32 | Tunisia | 420 |
| 9 | United States | 508 | 33 | Georgia | 410 |
| 10 | Lithuania | 506 | 34 | Iran | 403 |
| 11 | Czech | 504 | 35 | Bahrain | 398 |
| 12 | Slovenia | 501 | 36 | Indonesia | 397 |
| 13 | Armenia | 499 | 37 | Syria | 395 |
| 14 | Australia | 496 | 38 | Egypt | 391 |
| 15 | Sweden | 491 | 39 | Algeria | 387 |
| 16 | Malta | 488 | 40 | * Morocco | 381 |
| 17 | Scotland | 487 | 41 | Columbia | 380 |
| 18 | Serbia | 486 | 42 | Oman | 372 |
| 19 | Italy | 480 | 43 | Palestine | 367 |
| 20 | Malaysia | 474 | 44 | Botswana | 364 |
| 21 | Norway | 469 | 45 | Kuwait | 354 |
| 22 | Cyprus | 465 | 46 | El Salvador | 340 |
| 23 | Bulgaria | 464 | 47 | Saudi Arabia | 329 |
| 24 | Ukraine | 462 | 48 | Ghana | 309 |
| 25 | Romania | 461 | 49 | Qatar | 307 |
| Other participations | | | | | |
| | Massachusetts / America | 547 | | Columbia / Canada | 509 |
| | Minnesota / USA | 532 | | Basque / Spain | 499 |
| | Dubai / UAE | 528 | | Quebec / Canada | 461 |
| | Ontario / Canada | 517 | | | |

* The sample did not achieve the required participation average

| | |
|--------------------------------------|---|
| Average higher than Jordan's Average | Δ |
| Average similar to Jordan's Average | |
| Average lower than Jordan's Average | ▽ |

Math Test Items in TIMSS 2011

The number of items of the math test in “TIMSS 2007 - 2011 was (217) item question, distributed on the following contents: numbers, algebra, geometry, and data.

The questions covered the expected skills and performances in the following areas of knowledge:

- Knowing of facts and procedures (Knowing).
- Applying.
- Reasoning.

About (51%) of the test items were multiple choice, while (49%) of the test items were open ended questions as this type of questions requires students to form answers and write them in a particular space, (some questions require short answers and others require long answers). Table (8) shows the distribution of math items by content and by item type. Table (9) shows the distribution of items by cognitive domain and by the type of item.

Table (8)

Distribution of Math Test items by Content and by item Type

| Content | Multiple Choice items | Open items | Total of items | % of Scores |
|----------------------------|-----------------------|----------------|-----------------|-------------|
| Numbers | (31)31 | (36)30 | (67)61 | %29 |
| Algebra | (37)37 | (39)33 | (76)70 | %33 |
| Geometry | (25)25 | (19)18 | (44)43 | %19 |
| Data | (25)25 | (20)18 | (45)43 | %19 |
| Total | (118)118 | (114)99 | (232)217 | %100 |
| Scores' Percentages | | %51 | %49 | |

Table (9)**Distribution of Math Test items by Cognitive Domain and by item Type**

| Content | Multiple Choice items | Open items | Total of items | % of Scores |
|---------------------------------|------------------------------|-------------------|-----------------------|--------------------|
| knowing of facts and procedures | (53)53 | (30)27 | (83)80 | %36 |
| Applying | (47)47 | (44)38 | (91)85 | %39 |
| Reasoning | (18)18 | (40)34 | (58)52 | %25 |
| Total | (118)118 | (114)99 | (232)217 | %100 |
| Scores' Percentages | %51 | %49 | | |

The total of marks is between brackets

Math and science items were distributed in (28) clusters, and these clusters were distributed on (14) booklets, so that each student is given one booklet in the test following a random predefined procedure. Students answer the questions in (90) minutes distributed for two sessions with a 10-minute break. It should be noted that each booklet contains questions in math and other booklets contain questions of sciences. This means that students' achievement in math and science is measured by answering science and math questions in the first and second section of the test booklet.

Science Test Items in TIMSS 2011.

The number of items of the science test in TIMSS 2007 - 2011 was (217) item, distributed on the following contents: Biology, chemistry, physics, earth sciences. The questions covered the following areas of knowledge: knowing of the facts, applying, and reasoning.

(47%) of the test items were multiple choice, while (49%) of the test items were open ended questions as this type of questions requires students to form answers and write them in a particular space, (some items require short answers and others require long answers). Table (10) shows the distribution of science items by content and by item type. Table (11) shows the distribution of items by cognitive domain and by the type of item.

Table (10)

Distribution of Science Test Questions by Content by Question Type

| Content | Multiple Choice items | Open items | Total of items | % of Scores |
|--------------------------|-----------------------|-----------------|-----------------|-------------|
| Biology | (38)38 | (49)41 | (87)38 | %37 |
| Chemistry | (22)22 | (25)22 | (47)44 | %20 |
| Physics | (29)29 | (29)26 | (58)55 | %25 |
| Earth sciences | (21)21 | (21)18 | (42)39 | %18 |
| Total | (110)110 | (124)107 | (234)217 | %100 |
| Scores Percentage | %47 | %53 | | |

Table (11)

Distribution of Science Test items by Cognitive Domain and by item Type

| Content | Multiple Choice items | Open items | Total of items | % of Scores |
|--------------------------|-----------------------|-----------------|-----------------|-----------------|
| knowing of facts | %32 | (76)73 | (18)15 | (58)58 |
| Applying | %44 | (103)92 | (63)52 | (40)40 |
| Reasoning | %24 | (55)52 | (43)40 | (12)12 |
| Total | %100 | (234)217 | (124)107 | (110)110 |
| Scores Percentage | | | %53 | %47 |

The total of scores is between brackets

Instruments of TIMSS 2011.

test booklets

Math and science items were distributed on (14) test booklet numbered from one to 14, so that each student of the study sample answers one booklet of the 14 booklets that are previously identified for the student randomly. Each booklet includes items on math and science. Some items are multiple-choice, and others are open questions items that require the student to write short answers or long ones.

The design of the achievement test depends on clusters of items distributed on the test's booklets in an orderly manner. The cluster is a small set of items developed together. All of the test items were distributed on (28) clusters, half of which are math questions and the other half are science items, and each item appears in one cluster only. In the process of distributing clusters of items on the test's booklets, each cluster appears in two booklets and each booklet consists of two parts, each part contains two clusters in math or science as indicated in table (12).

Table (12)

Distribution of Test Item clusters for the Test Booklets

| Booklet No. | Part One | | Part Two | |
|--------------------|-----------------|-----|-----------------|-----|
| 1 | M01 | M02 | S01 | S02 |
| 2 | S02 | S03 | M02 | M03 |
| 3 | M03 | M04 | S03 | S04 |
| 4 | S04 | S05 | M04 | M05 |
| 5 | M05 | M06 | S05 | S06 |
| 6 | S06 | S07 | M06 | M07 |
| 7 | M07 | M08 | S07 | S08 |
| 8 | S08 | S09 | M08 | M09 |
| 9 | M09 | M10 | S09 | S10 |
| 10 | S10 | S11 | M10 | M11 |
| 11 | M11 | M12 | S11 | S12 |
| 12 | S12 | S13 | M12 | M13 |
| 13 | M13 | M14 | S13 | S14 |
| 14 | S14 | S01 | M14 | M01 |

S= Science cluster

M= Math cluster

Study's Questionnaires

The following four questionnaires were developed and implemented in the International Study for Math and Science / 2011 (TIMSS 2011):

1. **Student's questionnaires:** The student questionnaire included (21) item, and the students in the study sample answered them in about 40 minutes. The students' answers provided information on their family and academic background, and their attitudes and aspirations and classroom practices for math and science teachers from the students' perspectives.
2. **Math teacher's questionnaires:** The math teacher questionnaire included (30) items and was answered by the math teachers of the students in the study sample in about 60 minutes. The answers in this questionnaire provided information on their scientific and academic backgrounds, their teaching practices and their attitudes towards teaching math.
3. **Science teacher questionnaire:** The science teacher questionnaire included (29) items and was answered by the science teachers of the students in the study sample in about 60 minutes. The answers in this questionnaire provided information on their scientific and academic backgrounds, their teaching practices and their attitudes towards teaching science.
4. **The school's questionnaires:** The school's questionnaire included (17) items, answered by the schools' principals of students in the study sample in about 45 minutes. This questionnaire provided information on the school environment, academic staff, the curriculum, the study programs, the school facilities, the training and development programs at the school, the time spent by students in the school, particularly the time spent in learning math and science, and the actions undertaken by the school to build relationships with the community and the parents.

The study sample

Specific procedures were followed in the selection of the study sample in line with the sampling manual developed for the study purposes. The Jordanian educational management information database was used as the basis for the sample selection. In the first phase, the sampling unit was the school, and in the second phase, one or two sections from grade eight were randomly

selected. Therefore, the sampling design is the “Two-Stage probability proportional-to-size (PPS) sampling technique.”

The Statistics Centre in Canada (Statistics Canada is the responsible body for the study procedures and the sample selection. The National Center for Human Resources Development (NCHRD) provided the Center with the general framework of the Jordanian study population which included all schools in the country that including grade eight. The (NCHRD) also provided (Statistics Canada) with the following information on schools: school’s national number, the supervising authority (Ministry of Education, UNRWA, and private education), the total number of grade eight students in each school, the number of grade eight sections, class size of each school, the school location (rural, Urban), the school sex (male, female, coed), and the school explicit strata (discovery, Madrasati, Education Reform Support Project (ERSP), Ministry of Education, UNRWA, and private education). In addition, the Statistics Centre in Canada was provided with general information describing the educational system in Jordan, so that the Center selects the study sample in accordance with the international standards of the study sample.

The selection of the sample took into account the school size (the number of eighth grade students in the school) and the sex of the school, its location, in addition to that, the sampling weights were calculated and taken into account in the results analysis. One or two grade eight sections were randomly selected per school in the sample.

The final sample of the study consisted of (230) schools, randomly selected from the population of the schools in the country that contain grade eight schools. The total number of students in the study sample is (7694) students. Tables (13), (14), (15), (16), (17) show the distribution of the sample by the authority, location, school sex, gender, and the sampling strata.

Table (13)

**Distribution of Students and Schools of the
Study Sample (TIMSS 2011) by the Supervising Authority**

| Authority | Student | | Schools | |
|-----------------------|---------|-----|---------|-----|
| | No. | % | No. | % |
| Ministry of Education | 6316 | 83 | 180 | 78 |
| UNRWA | 843 | 11 | 25 | 11 |
| Private Education | 535 | 7 | 25 | 11 |
| Total | 7694 | 100 | 230 | 100 |

Table (14)

**Distribution of Students and Schools of the
Study Sample (TIMSS 2011) by the School Location**

| School location | Student | | Schools | |
|-----------------|---------|-----|---------|-----|
| | No. | % | No. | % |
| Urban | 6202 | 81 | 180 | 78 |
| Rural | 1492 | 19 | 50 | 22 |
| Total | 7694 | 100 | 230 | 100 |

Table (15)

**Distribution of Students and Schools of the
Study Sample (TIMSS 2011) by the School sex**

| School Sex | Student | | Schools | |
|------------|---------|-----|---------|-----|
| | No. | % | No. | % |
| Males | 3315 | 43 | 101 | 44 |
| Females | 2566 | 33 | 71 | 31 |
| coed | 1813 | 24 | 58 | 25 |
| Total | 7694 | 100 | 230 | 100 |

Table (16)

**Distribution of Students and Schools
of the Study Sample (TIMSS 2011) by Gender**

| Gender | Student | |
|---------|---------|-----|
| | No. | % |
| Males | 3604 | 47 |
| Females | 4090 | 53 |
| Total | 7694 | 100 |

Table (17)

Distribution of Students and Schools of the Study Sample (TIMSS 2011) by Strata

| Strata | Student | | Schools | |
|--------------------------|---------|-----|---------|-----|
| | No. | % | No. | % |
| Discovery / the Ministry | 932 | 12 | 25 | 11 |
| Ministry of Education | 3145 | 41 | 100 | 43 |
| UNRWA | 843 | 11 | 25 | 11 |
| Private Education | 535 | 7 | 25 | 11 |
| Madrasati / the Ministry | 752 | 10 | 25 | 11 |
| ERSP/ the Ministry | 1487 | 19 | 30 | 13 |
| Total | 7694 | 100 | 230 | 100 |

Procedures of Implementing TIMSS 2011

All phases of the study were carried out in Jordan in close collaboration between the National Center for Human Resources Development and the Ministry of Education.

1. **Translation of the study tools:** A national team translated the achievement tests in math and science, the student's questionnaire, the math teacher's questionnaire, the science teacher questionnaire, and the school principal questionnaire to Arabic and adapted the translated tools to suit the Jordanian context. The translation has taken into account specific set of standards developed by the International Association for the Evaluation of Educational Achievement (IEA). In addition, guides were translated to ensure the control of the tools implementation, such as the study administrator

manual, the Coordinator manual, and the coding manual. The translated instruments were sent to the (IEA), (the study's supervisor) which is based in Amsterdam/ Netherlands, to be audited by specialized centers as the translations of other countries. The translation was sent back to Jordan to insert the required modifications, and the final version of the study instruments was developed.

2. **Printing the study Instruments:** After checking the accuracy of the study instruments translation, the following instruments were printed: (9000) test booklets, (9000) student questionnaire, (350) math teacher questionnaires, administration, (350) science teacher questionnaires, (300) schools questionnaires, (100) administrator manuals, quality control manual, and (100) scoring manual.
3. **Training on the administration:** A workshop was held at the National Center for Human Resources Development to train the data collectors on the steps that must be followed in the process of collecting data from the field.
4. **Data collection:** Data was collected from the field in April / 2011 in accordance with specific instructions for this process, and for the purposes of controlling the quality of the study's administration. A national team was formed to control the quality of the study. The team visited a group of schools that implemented the study to check the procedures carried out by the coordinators, the administrators, and the extent of their commitment to the study administration instructions. In addition to the national team for the quality control, an international team visited (10%) of the sample schools that were selected randomly a sample of schools during the administration period to ensure the compliance with the study administration instructions by the implementers.
5. **Coding :** The achievement test booklets in math and science included open questions that require students to write short answers, while others require longer answers. A qualified team in math and science coded the questions after receiving training on this process as stated in the manual prepared by the (IEA). (30) educational supervisor of math and science participated in the coding process that lasted for (20) days.
6. **Data entry:** The data collected from the field was saved on computer using software developed by the (IEA). Prior to the data entry process, a training workshop was held for a team of (14) persons who entered the data.
7. **Data processing:** All of the participating countries sent their data to the International Study Center in Hamburg (a Data Processing Center), and this data was completed in the end of July in 2011. Advanced analysis methods were followed to derive common standards to compare students' performance averages in the participating countries in

math and science. The study findings were disseminated in two international reports, one on math, and the other on science in December/2012.

Countries Participating in TIMSS 2011

Table (18) shows a group of countries participating in the study. The number of non-Arab participations is (34), and number of Arab participations is (11) countries, while the number of non-international participations is (14) educational systems.

Table (18)

Participating Countries in TIMSS 2011

| Non-Arab international participations | | | | Arab participations | | Non-international participations | |
|---------------------------------------|------------|----|---------------|---------------------|--------------|----------------------------------|---------------------|
| 1 | Armenia | 18 | Lithuania | 1 | Bahrain | 1 | Alberta / Canada |
| 2 | Australia | 19 | Macedonia | 2 | Jordan | 2 | Ontario / Canada |
| 3 | Chile | 20 | Malaysia | 3 | Lebanon | 3 | Quebec / Canada |
| 4 | Taiwan | 21 | New Zealand | 4 | Morocco | 4 | Abu Dhabi / UAE |
| 5 | England | 22 | Norway | 5 | Oman | 5 | Dubai / UAE |
| 6 | Finland | 23 | Romania | 6 | Palestine | 6 | Alabama / America |
| 7 | Georgia | 24 | Russia | 7 | Qatar | 7 | California / USA |
| 8 | Ghana | 25 | Singapore | 8 | Saudi Arabia | 8 | Colorado / America |
| 9 | Hong Kong | 26 | Slovenia | 9 | Syria | 9 | Connecticut / USA |
| 10 | Hungary | 27 | Sweden | 10 | Tunisia | 10 | Florida / Latino |
| 11 | Indonesia | 28 | Thailand | 11 | Emirates | 11 | Indiana / USA |
| 12 | Iran | 29 | Turkey | | | 12 | Massachusetts / USA |
| 13 | Israel | 30 | Ukraine | | | 13 | Minnesota / USA |
| 14 | Italy | 31 | United States | | | 14 | Carolina / USA |
| 15 | Japan | 32 | Botswana | | | | |
| 16 | Kazakhstan | 33 | Honduras | | | | |
| 17 | Korea | 34 | South Africa | | | | |

Chapter Two

Performance on the Science Test

Table (19) shows the overall performance averages of the students in the participating countries in the science test.

These results indicate that Jordan ranked (28) among the participating countries. Jordan's performance average is (28) scores below the international average, and Jordan ranked third among the Arab countries participating in the study. However, Jordan's performance did not differ from the performance of Bahrain and Thailand.

Jordanian students outperformed the students of the following (17) countries: Tunisia, Armenia, Saudi Arabia, Malaysia, Syria, Palestine, Georgia, Oman, Qatar, Macedonia, Lebanon, Indonesia, Morocco, Ghana, Botswana, Honduras, and South Africa.

The averages of the following (25) countries were higher than Jordan: Singapore, Taiwan, Korea, Japan, Finland, Slovenia, Russia, Hong Kong, England, the United States, Hungary, Australia, Israel, Lithuania, New Zealand, Sweden, Italy, and Ukraine , Norway, Kazakhstan, Turkey, Iran, Romania, and the United Arab Emirates, and Chile.

Table (20) shows the performance averages of the Arab countries participating in the study, and Figure (1) shows the performance averages of the Arab countries in science. It should be noted that the performance average of Jordanian students in science was higher than the Arab averages with (21) scores and this difference is statistically significant. Jordan's average is higher than the average of the following participating Arab countries: Tunisia, Saudi Arabia, Syria, Palestine, Oman, Qatar, and Lebanon with statistical significance.

Table (19)

Performance Averages of Participating Countries in Science in (TIMSS 2011)

| | Country | Average | | Country | Average |
|---|-----------|--------------|----|----------------------|--------------|
| 1 | Singapore | 590 Δ | 23 | Romania | 465 Δ |
| 2 | Taiwan | 564 Δ | 24 | United Arab Emirates | 465 Δ |
| 3 | Korea | 560 Δ | 25 | Chile | 461 Δ |

| | | | | | |
|----------------------|----------------------------------|---|-----------|-------------------|--|
| 4 | Japan | 558 △ | 26 | Bahrain | 452 |
| 5 | Finland | 552 △ | 27 | Thailand | 451 |
| 6 | Slovenia | 543 △ | 28 | Jordan | 449 |
| 7 | Russia | 542 △ | 29 | Tunisia | 439 ▽ |
| 8 | Hong Kong | 535 △ | 30 | Armenia | 437 ▽ |
| 9 | England | 533 △ | 31 | Saudi Arabia | 436 ▽ |
| 10 | United States | 525 △ | 32 | Malaysia | 426 ▽ |
| 11 | Hungary | 522 △ | 33 | Syria | 426 ▽ |
| 12 | Australia | 519 △ | 34 | Palestine | 420 ▽ |
| 13 | Israel | 516 △ | 35 | Georgia | 420 ▽ |
| 14 | Lithuania | 514 △ | 36 | Oman | 420 ▽ |
| 15 | New Zealand | 512 △ | 37 | Qatar | 419 ▽ |
| 16 | Sweden | 509 △ | 38 | Macedonia | 407 ▽ |
| 17 | Italy | 501 △ | 39 | Lebanon | 406 ▽ |
| 18 | Ukraine | 501 △ | 40 | Indonesia | 406 ▽ |
| 19 | Norway | 494 △ | 41 | Morocco | 376 ▽ |
| 20 | Kazakhstan | 490 △ | 42 | Ghana | 306 ▽ |
| 21 | Turkey | 483 △ | 43 | Botswana | 404 ▽ |
| | The international average | 477 △ | 44 | Honduras | 369 ▽ |
| 22 | Iran | 474 △ | 45 | South Africa | 332 ▽ |
| Other participations | | | | | |
| 1 | Massachusetts / USA | 567 △ | 8 | Florida / USA | 530 △ |
| 2 | Minnesota / USA | 553 △ | 9 | Ontario / Canada | 521 △ |
| 3 | Alberta / Canada | 546 △ | 10 | Quebec / Canada | 520 △ |
| 4 | Colorado / America | 542 △ | 11 | California / USA | 499 △ |
| 5 | Indiana / USA | 533 △ | 12 | Alabama / America | 485 △ |
| 6 | Connecticut / USA | 532 △ | 13 | Dubai / UAE | 485 △ |
| 7 | Carolina / USA | 532 △ | 14 | Abu Dhabi / UAE | 461 △ |

| | |
|--------------------------------------|--------------------------------------|
| Average higher than Jordan's Average | △ |
| Average similar to Jordan's Average | |
| Average lower than Jordan's Average | ▽ |

Table (20)

Performance Averages of Participating Arab Countries in Science in (TIMSS 2011)

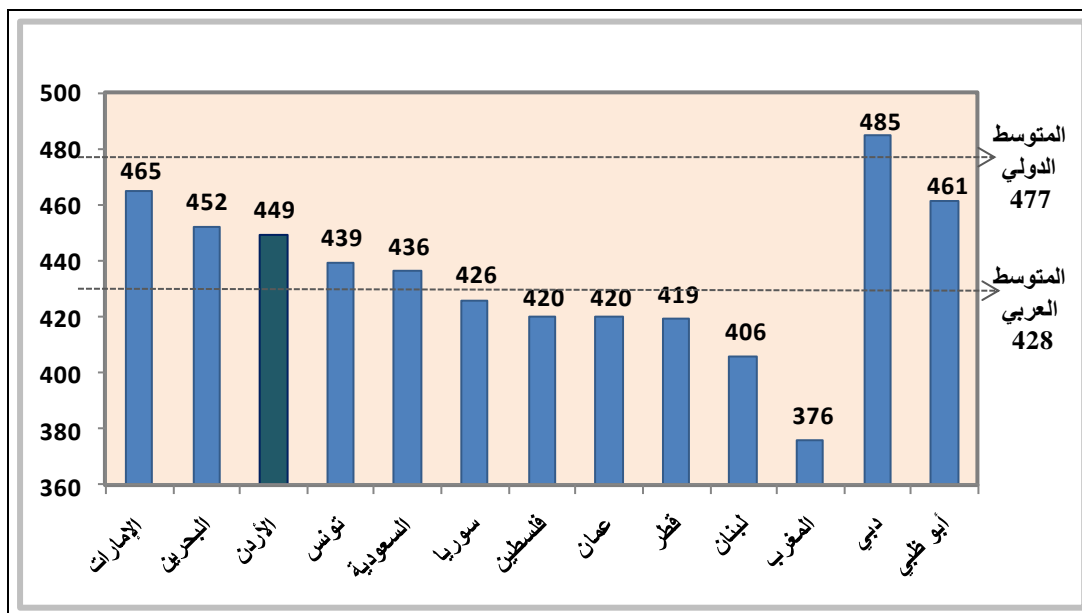
| | Country | Performance average |
|---|----------------------------------|--|
| | The international average | 477 △ |
| 1 | United Arab Emirates | 465 △ |
| 2 | Bahrain | 452 |

| | | |
|----|---------------------|-------|
| 3 | Jordan | 449 |
| 4 | Tunisia | 439 ▽ |
| 5 | Saudi Arabia | 436 ▽ |
| 6 | Arab average | 428 ▽ |
| 7 | Syria | 426 ▽ |
| 8 | Palestine | 420 ▽ |
| 9 | Oman | 420 ▽ |
| 10 | Qatar | 419 ▽ |
| 11 | Lebanon | 406 ▽ |
| 12 | Morocco | 376 ▽ |
| | Dubai / UAE | 485 Δ |
| | Abu Dhabi / UAE | 461 Δ |

| | |
|--------------------------------------|---|
| Average higher than Jordan's Average | Δ |
| Average similar to Jordan's Average | |
| Average lower than Jordan's Average | ▽ |

Figure (1)

Performance Averages of the Arab Countries in Science



Performance in the Science Test by International benchmarks Levels

The international study identifies the following four benchmarks levels:

- Advanced Achievement level in science, representing students who got 625 scores or more.
- High Achievement level in science, representing students who got 550 scores or more.
- Moderate Achievement level in science, representing students who got 475 scores or more.
- Low Achievement level in Science, representing students who got 400 scores or more.

It should be noted that these levels are cumulative, i.e., students who reach a certain level, have already reached the levels below it. In other words, student who reached the high achievement level, have already reached the moderate and low levels, but were unable to reach the advanced level.

Advanced achievement level

Students who reached the advanced achievement level are able to:

- Understand and comprehend some abstract and compound concepts of science.
- Apply what they understand about the complex relationships between organisms, and link this relationship with the organisms' environment.
- Demonstrate their understanding of electricity, thermal expansion, sound, and material composition, properties, and physical and chemical changes, as well as understanding resources and environmental issues.
- Understand some of the scientific research issues.
- apply the physical principles in solving some of the quantitative issues.
- provide scientific explanations in writing to communicate and exchange them.

The following example shows a question of science for grade eight, which the majority of students reaching the advanced achievement level of (625) scores answered it correctly.

**An example of a question answered by most
students in grade eight reaching the advanced achievement level**

| Country | Percentage of Correct Answers | | | Content Domain: Chemistry | | | |
|---------------|----------------------------------|-------|---|---|----|-------|---|
| | | | | Knowledge Domain: knowing | | | |
| | | | | Describing things that can be seen in a chemical reaction | | | |
| England | 59 | (2.6) | ▲ | Ahmed put some powder in a test tube, then he added liquid to the powder and shock the tube test, and a chemical reaction happened. | | | |
| New Zealand | 50 | (2.5) | ▲ | | | | |
| America | 46 | (1.5) | ▲ | Describe two possible things that Ahmed might see when the reaction takes place | | | |
| Taiwan | 44 | (2.0) | ▲ | | | | |
| Russia | 44 | (2.4) | ▲ | 1. Change in the heat | | | |
| Singapore | 44 | (1.9) | ▲ | | | | |
| Australia | 42 | (2.3) | ▲ | 2. Gas bubbles | | | |
| Emirates | 37 | (1.3) | ▲ | | | | |
| Finland | 36 | (2.3) | ▲ | | | | |
| Hong Kong | 35 | (1.9) | ▲ | | | | |
| Norway | 32 | (2.5) | ▲ | | | | |
| Japan | 30 | (2.1) | ▲ | | | | |
| Saudi Arabia | 30 | (2.1) | ▲ | | | | |
| Syria | 30 | (2.4) | ▲ | | | | |
| Slovenia | 30 | (2.1) | ▲ | | | | |
| Jordan | 28 | (2.0) | ▲ | | | | |
| Ukraine | 27 | (2.5) | | | | | |
| International | 24 | (0.3) | | | | | |
| Bahrain | 23 | (1.4) | | | | | |
| Israel | 23 | (2.0) | | | | | |
| Korea | 23 | (1.6) | | | | | |
| Lebanon | 22 | (2.3) | | | | | |
| Qatar | 22 | (2.2) | | | | | |
| Lithuania | 21 | (1.9) | | | | | |
| Palestine | 21 | (1.8) | | | | | |
| Sweden | 18 | (1.5) | ▼ | | | | |
| Tunisia | 18 | (1.6) | ▼ | | | | |
| Kazakhstan | 17 | (2.0) | ▼ | | | | |
| Romania | 17 | (1.6) | ▼ | | | | |
| Oman | 17 | (1.4) | ▼ | Minnesota / USA | 53 | (2.6) | ▲ |
| Iran | 17 | (1.7) | ▼ | Massachusetts / USA | 52 | (3.4) | ▲ |
| Hungary | 15 | (1.4) | ▼ | Indiana / USA | 51 | (3.2) | ▲ |
| Armenia | 14 | (1.5) | ▼ | Colorado / America | 51 | (3.7) | ▲ |
| | | | | Carolina / America | 47 | (3.8) | ▲ |

| | | | | | | | |
|--------------|----|-------|---|---|----|-------|---|
| Malaysia | 10 | (1.2) | ▼ | Quebec / Canada | 44 | (2.2) | ▲ |
| Italy | 9 | (1.3) | ▼ | California / USA | 44 | (3.6) | ▲ |
| Turkey | 8 | (1.2) | ▼ | Florida / USA | 42 | (3.8) | ▲ |
| Thailand | 8 | (1.3) | ▼ | Dubai / UAE | 39 | (1.8) | ▲ |
| Chile | 7 | (0.9) | ▼ | Abu Dhabi / UAE | 39 | (2.4) | ▲ |
| Indonesia | 6 | (0.9) | ▼ | Alabama / America | 38 | (4.1) | ▲ |
| Macedonia | 5 | (1.1) | ▼ | Connecticut / USA | 37 | (3.7) | ▲ |
| Morocco | 4 | (0.5) | ▼ | Alberta / Canada | 37 | (2.3) | ▲ |
| Georgia | 3 | (1.0) | ▼ | Ontario / Canada | 32 | (2.3) | ▲ |
| Ghana | 1 | (0.4) | ▼ | | | | |
| Botswana | 11 | (1.0) | ▼ | Percentage is higher than the international average with statistical difference | | | ▲ |
| South Africa | 8 | (0.8) | ▼ | Percentage is lower than the international average with statistical difference | | | ▼ |
| Honduras | 8 | (1.3) | ▼ | Percentage is similar to the international average | | | |

High achievement level:

Students who reached the high achievement level are able to:

- show their understanding of some concepts of scientific cycles, systems and principles.
- have some understanding of the earth processes, the solar system, the biological systems, population, reproduction, genetics and the organs composition and functions.
- show some understanding of the physical and chemical changes and the material composition.
- solve some physical issues related to light, heat, electricity and magnetism.
- show basic knowledge of key environmental issues.
- show some scientific inquiry skills.
- gather information and extract conclusions, interpret data using graphs, charts and tables, or through solving problems or providing brief scientific explanation showing the relationship between the cause and the effect.

The following example shows a question of science for grade eight, which the majority of students reaching the high achievement level answered it correctly.

**An example of a question answered by most
students in grade eight reaching the high achievement level**

| Country | Percentage of Correct Answers | | | Content Domain: Physics | | | |
|-----------------------|----------------------------------|-------|---|---|----|-------|---|
| | | | | Knowledge Domain: knowing | | | |
| | | | | Description: To know what happens to the molecules of the liquid when cooling it | | | |
| Korea | 82 | (1.4) | ▲ | <p>What happens to the liquid molecules when cooling it?</p> <p>A becomes slower</p> <p>B become faster</p> <p>C decreases the number</p> <p>D decrease in size</p> | | | |
| Slovenia | 80 | (2.0) | ▲ | | | | |
| Russia | 77 | (2.0) | ▲ | | | | |
| Israel | 75 | (2.0) | ▲ | | | | |
| Singapore | 73 | (1.8) | ▲ | | | | |
| Finland | 73 | (2.0) | ▲ | | | | |
| America | 73 | (1.5) | ▲ | | | | |
| Sweden | 72 | (1.9) | ▲ | | | | |
| Kazakhstan | 71 | (2.4) | ▲ | | | | |
| New Zealand | 70 | (2.3) | ▲ | | | | |
| Hungary | 70 | (2.1) | ▲ | | | | |
| Norway | 68 | (2.8) | ▲ | | | | |
| Bahrain | 67 | (2.1) | ▲ | | | | |
| Ukraine | 67 | (2.6) | ▲ | | | | |
| England | 65 | (2.3) | ▲ | | | | |
| Turkey | 63 | (1.7) | ▲ | | | | |
| Saudi Arabia | 63 | (2.0) | ▲ | | | | |
| Australia | 62 | (2.1) | ▲ | | | | |
| UAE | 60 | (1.3) | | | | | |
| Iran | 60 | (2.2) | | | | | |
| Armenia | 59 | (2.8) | | | | | |
| Romania | 59 | (1.9) | | | | | |
| Lithuania | 59 | (2.5) | | | | | |
| International average | 58 | (0.3) | | | | | |
| Georgia | 56 | (2.2) | | | | | |
| Italy | 56 | (2.5) | | | | | |
| Taiwan | 56 | (1.9) | | | | | |
| Malaysia | 53 | (2.2) | ▼ | Other Participations | | | |
| Hong Kong | 52 | (2.2) | ▼ | Alberta / Canada | 86 | (1.6) | ▲ |
| Chile | 51 | (2.2) | ▼ | Massachusetts / USA | 86 | (2.2) | ▲ |
| Oman | 50 | (1.8) | ▼ | Ontario / Canada | 83 | (1.6) | ▲ |
| Japan | 50 | (2.3) | ▼ | Florida / USA | 81 | (3.6) | ▲ |
| Macedonia | 49 | (2.4) | ▼ | Indiana / USA | 79 | (2.7) | ▲ |
| Qatar | 47 | (2.1) | ▼ | Minnesota / USA | 79 | (2.7) | ▲ |

| | | | | | | | |
|--------------|----|-------|---|---|----|-------|---|
| Jordan | 46 | (1.9) | ▼ | Colorado / America | 76 | (2.4) | ▲ |
| Thailand | 41 | (1.9) | ▼ | Connecticut / USA | 75 | (2.4) | ▲ |
| Palestine | 40 | (1.8) | ▼ | Carolina / USA | 71 | (4.0) | ▲ |
| Syria | 37 | (2.1) | ▼ | California / Latino | 71 | (2.3) | ▲ |
| Lebanon | 37 | (2.5) | ▼ | Alabama / America | 65 | (3.4) | ▲ |
| Indonesia | 35 | (2.3) | ▼ | Quebec / Canada | 65 | (2.2) | ▲ |
| Morocco | 33 | (1.6) | ▼ | Abu Dhabi / UAE | 61 | (2.1) | |
| Tunisia | 32 | (2.1) | ▼ | Dubai / UAE | 59 | (2.2) | |
| Ghana | 31 | (1.8) | ▼ | | | | |
| South Africa | 47 | (1.8) | ▼ | Percentage is higher than the international average with statistical difference | | | ▲ |
| Honduras | 37 | (2.3) | ▼ | Percentage is lower than the international average with statistical difference | | | ▼ |
| Botswana | 36 | (1.9) | ▼ | Percentage is similar to the international average | | | |

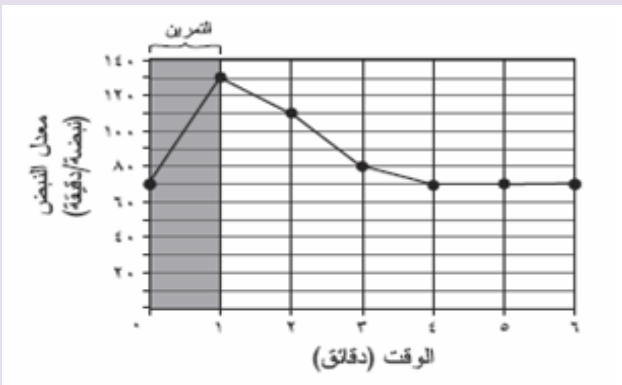
Moderate achievement level:

Students who reached the moderate achievement level are able to:

- understand basic scientific knowledge and transfer it over a given range of topics.
- recognize some properties of the solar system, the water cycle, animals, and human health.
- know some facts about energy, power, movement, reflection of light and sound.
- have basic knowledge of the solar system, earth operations, resources and environment.
- apply and share knowledge using tables, and derive information from data represented in flat or three-dimensional graphs.

The following example shows a question of science for grade eight, which the majority of students reaching the moderate achievement level answered it correctly.

An example of a question answered by most students in grade eight reaching the average achievement level

| Country | Percentage of Correct Answers | | | Content Domain: Biology | | | |
|---------------------------|-------------------------------|-------|---|---|----|-------|---|
| | | | | Knowledge Domain: Conclusions | | | |
| | | | | Description: To differentiate the characteristics which only mammals have and other animals do not. | | | |
| Japan | 82 | (1.7) | ▲ | <p>Jamal measured his pulse rate before the exercise, and found that it was 70 beats per minute. Jamal exercised for one minute and then measured his pulse rate. Then he measured his pulse rate it every minute for several minutes. Later, he drew this chart to display the results.</p>  <p>What can be deduced from these results?</p> <p>A The pulse rate rose of about 50 beats per minute</p> <p>B The pulse rate took less time to decline than to rise</p> <p>C The pulse rate was 80 beats per minute after 4 minutes.</p> <p>D The pulse rate returned to the normal average in less than 6 minutes</p> | | | |
| Korea | 80 | (1.6) | ▲ | | | | |
| Finland | 80 | (1.9) | ▲ | | | | |
| Italy | 79 | (1.9) | ▲ | | | | |
| Russia | 75 | (1.9) | ▲ | | | | |
| Singapore | 75 | (1.6) | ▲ | | | | |
| Sweden | 75 | (1.7) | ▲ | | | | |
| Israel | 74 | (1.7) | ▲ | | | | |
| Lithuania | 74 | (2.0) | ▲ | | | | |
| Norway | 73 | (2.5) | ▲ | | | | |
| America | 73 | (1.2) | ▲ | | | | |
| Slovenia | 71 | (1.9) | ▲ | | | | |
| England | 69 | (2.6) | ▲ | | | | |
| Australia | 66 | (2.3) | ▲ | | | | |
| Taiwan | 64 | (2.0) | ▲ | | | | |
| New Zealand | 62 | (1.9) | ▲ | | | | |
| Chile | 62 | (2.0) | ▲ | | | | |
| Romania | 61 | (1.9) | | | | | |
| Hong Kong | 60 | (2.3) | | | | | |
| Malaysia | 60 | (1.8) | | | | | |
| Turkey | 60 | (1.9) | | | | | |
| The international average | 57 | (0.3) | | | | | |
| Ukraine | 56 | (3.0) | | | | | |
| UAE | 54 | (1.5) | ▼ | | | | |
| Iran | 51 | (1.9) | ▼ | | | | |
| Georgia | 49 | (2.6) | ▼ | | | | |
| Tunisia | 49 | (2.1) | ▼ | | | | |
| Hungary | 48 | (2.1) | ▼ | | | | |
| Saudi Arabia | 46 | (2.3) | ▼ | | | | |
| Bahrain | 46 | (2.1) | ▼ | | | | |
| Lebanon | 46 | (2.5) | ▼ | | | | |
| Indonesia | 46 | (2.2) | ▼ | | | | |
| Thailand | 45 | (2.1) | ▼ | | | | |
| | | | | Minnesota / USA | 79 | (2.5) | ▲ |
| | | | | Massachusetts / USA | 77 | (2.8) | ▲ |
| | | | | Carolina / USA | 76 | (3.2) | ▲ |
| | | | | Indiana / USA | 76 | (2.3) | ▲ |
| | | | | Quebec / Canada | 76 | (2.0) | ▲ |

| | | | | | | | |
|--------------|----|-------|---|---|----|-------|---|
| Macedonia | 45 | (2.3) | ▼ | Connecticut / USA | 75 | (2.7) | ▲ |
| Kazakhstan | 44 | (2.3) | ▼ | Alberta / Canada | 73 | (2.1) | ▲ |
| Qatar | 43 | (2.2) | ▼ | Ontario / Canada | 71 | (2.2) | ▲ |
| Jordan | 43 | (2.3) | ▼ | Colorado / America | 70 | (3.0) | ▲ |
| Armenia | 42 | (2.2) | ▼ | Florida / USA | 67 | (3.9) | ▲ |
| Morocco | 42 | (1.4) | ▼ | California / USA | 64 | (2.5) | ▲ |
| Oman | 42 | (1.5) | ▼ | Alabama / America | 60 | (3.0) | |
| Palestine | 38 | (1.9) | ▼ | Dubai / America | 57 | (2.0) | |
| Syria | 32 | (2.6) | ▼ | Abu Dhabi / America | 55 | (2.2) | |
| Ghana | 30 | (1.5) | ▼ | | | | |
| Botswana | 48 | (1.7) | ▼ | Percentage is higher than the international average with statistical difference | | | ▲ |
| Honduras | 37 | (2.1) | ▼ | Percentage is lower than the international average with statistical difference | | | ▼ |
| South Africa | 31 | (1.3) | ▲ | Percentage is similar to the international average | | | |

Low achievement level:

Students who reached the low achievement level are able to:

- understand some facts about the physical and biological sciences.
- have some knowledge on the human body and on genetics.
- be familiar with some physiological phenomena that are relevant to everyday life.
- interpret three-dimensional graphs, and apply knowledge and physical facts in practical situations.

The following example shows a question of science for grade eight, which the majority of students reaching the low achievement level answered it correctly.

An example of a question answered by most students in grade eight reaching the low achievement level

| Country | Percentage of Correct Answers | | | Content Domain: Biology |
|-----------|-------------------------------|-------|---|--|
| | | | | Knowledge Domain: Application |
| | | | | Description: Genes are taken from both parents |
| Japan | 95 | (0.9) | ▲ | Twins are born. One is a boy and the other is a girl. What is the correct sentence regarding their genetic composition? A The boy and the girl inherit the genetic traits of the father only |
| Finland | 94 | (1.0) | ▲ | |
| Korea | 93 | (0.9) | ▲ | |
| Singapore | 92 | (1.0) | ▲ | |
| Slovenia | 91 | (1.4) | ▲ | |



| | | | | | | |
|---------------------------|----|-------|---|--|----|---------|
| Jordan | 91 | (1.1) | ▲ | B The boy and the girl inherit the genetic traits of the mother only C The Boy and the girl inherits the genetic traits of both parents D The boy inherits the genetic traits of the father only and the girl inherits the genetic traits of the mother only | | |
| America | 90 | (0.8) | ▲ | | | |
| Israel | 90 | (1.4) | ▲ | | | |
| Taiwan | 89 | (1.2) | ▲ | | | |
| England | 88 | (1.7) | ▲ | | | |
| Hong Kong | 88 | (1.5) | ▲ | | | |
| Russia | 88 | (1.5) | ▲ | | | |
| Italy | 88 | (1.6) | ▲ | | | |
| Hungary | 87 | (1.4) | ▲ | | | |
| Armenia | 87 | (1.4) | ▲ | | | |
| Tunisia | 87 | (1.2) | ▲ | | | |
| Ukraine | 86 | (2.2) | ▲ | | | |
| UAE | 86 | (1.0) | ▲ | | | |
| Australia | 86 | (1.5) | | | | |
| Bahrain | 85 | (1.4) | | | | |
| Saudi Arabia | 85 | (1.4) | | | | |
| New Zealand | 85 | (1.6) | | | | |
| Lithuania | 84 | (1.7) | | | | |
| Turkey | 84 | (1.3) | | | | |
| Palestine | 84 | (1.3) | | | | |
| The international average | 83 | (0.2) | | | | |
| Sweden | 83 | (1.5) | | | | |
| Romania | 83 | (1.5) | | | | |
| Norway | 82 | (1.6) | | Massachusetts / USA | 95 | (1.3) ▲ |
| Qatar | 82 | (1.8) | | Minnesota / USA | 94 | (1.1) ▲ |
| Syria | 81 | (1.7) | | Indiana / USA | 92 | (1.3) ▲ |
| Oman | 81 | (1.2) | ▼ | Carolina / USA | 91 | (1.7) ▲ |
| Morocco | 80 | (1.6) | ▼ | Connecticut / USA | 89 | (1.8) ▲ |
| Chile | 80 | (1.5) | ▼ | Alberta / Canada | 89 | (1.3) ▲ |
| Kazakhstan | 79 | (1.7) | ▼ | Colorado / America | 89 | (2.0) ▲ |
| Thailand | 77 | (1.8) | ▼ | Alabama / America | 88 | (2.2) ▲ |
| Georgia | 76 | (2.8) | ▼ | Florida / USA | 87 | (2.8) ▲ |
| Lebanon | 76 | (2.2) | ▼ | Quebec / Canada | 87 | (1.5) ▲ |
| Iran | 75 | (1.8) | ▼ | Ontario / Canada | 87 | (1.5) ▲ |
| Indonesia | 70 | (2.3) | ▼ | California / Latino | 86 | (1.8) ▲ |
| Ghana | 69 | (1.5) | ▼ | Abu Dhabi / UAE | 86 | (1.4) ▲ |
| Malaysia | 69 | (1.7) | ▼ | Dubai / UAE | 86 | (1.8) ▲ |
| Macedonia | 63 | (2.4) | ▼ | | | |
| South Africa | 73 | (1.2) | ▼ | Percentage is higher than the international average with statistical difference | | ▲ |
| Honduras | 66 | (2.0) | ▼ | Percentage is lower than the international average with statistical difference | | ▼ |
| Botswana | 63 | (1.6) | ▼ | Percentage is similar to the international average | | |

Table (21) shows the percentages of students who reached the achievement levels for all countries, and table (22) shows the percentages of Arab students. These tables clearly show that the percentage of Jordanian students who reached the advanced level is (2%), and it is less than the international percentage in this level, which is (4%), and is equal to the Arab percentage. Regarding the high achievement level, Jordan's percentage is (15%), which is less than the international percentage that is (21%), and is higher than the Arab percentage which is (11%). For the moderate achievement level, Jordan's percentage is (45%), which is less than the international percentage that reached (52%), and is higher than the Arab percentage in this level which is (34%). And with regard to the low achievement level, Jordan's percentage is (72%), and it is less than the international percentage in this level, which is (79%), but is higher than the Arab percentage of the Arab countries in this level, which is (68%).

In sum, the percentages of the Jordanians students in the four achievement levels are better than the Arab median percentages, but are below the similar international percentages in all levels.

Table (21)

Percentages of Students by Performance Levels in Science for the Participating Countries

| | Country | Advanced | High | Moderate(475) | Low | | Country | Advanced | High | Moderate(475) | Low |
|----|-------------|----------|------|---------------|-----|----|---------------|----------|-----------|---------------|-----------|
| 1 | Singapore | 40 | 69 | 87 | 96 | 22 | Kazakhstan | 4 | 23 | 58 | 86 |
| 2 | Taiwan | 24 | 60 | 85 | 96 | 23 | Bahrain | 3 | 17 | 44 | 70 |
| 3 | Korea | 20 | 57 | 86 | 97 | 24 | Qatar | 3 | 14 | 34 | 58 |
| 4 | Japan | 18 | 57 | 86 | 97 | 25 | Norway | 3 | 22 | 62 | 90 |
| 5 | Russia | 14 | 48 | 81 | 96 | 26 | Romania | 3 | 16 | 47 | 78 |
| 6 | England | 14 | 44 | 76 | 93 | 27 | Jordan | 2 | 15 | 45 | 72 |
| 7 | Slovenia | 13 | 48 | 82 | 96 | 28 | Macedonia | 2 | 10 | 30 | 53 |
| 8 | Finland | 13 | 53 | 88 | 99 | 29 | Oman | 2 | 11 | 34 | 59 |
| 9 | Israel | 11 | 39 | 69 | 88 | 30 | Armenia | 1 | 12 | 37 | 66 |
| 10 | Australia | 11 | 35 | 70 | 92 | 31 | Malaysia | 1 | 11 | 34 | 62 |
| 11 | America | 10 | 40 | 73 | 93 | 32 | Thailand | 1 | 10 | 39 | 74 |
| 12 | Hong Kong | 9 | 47 | 80 | 95 | 33 | Chile | 1 | 12 | 43 | 79 |
| 13 | New Zealand | 9 | 34 | 67 | 90 | 34 | Palestine | 1 | 10 | 33 | 59 |
| 14 | Hungary | 9 | 39 | 75 | 92 | 35 | Lebanon | 1 | 7 | 25 | 54 |
| 15 | Turkey | 8 | 26 | 54 | 79 | 36 | Saudi Arabia | 1 | 8 | 33 | 68 |
| 16 | Sweden | 6 | 33 | 68 | 91 | 37 | Georgia | 0 | 6 | 28 | 62 |
| 17 | Lithuania | 6 | 33 | 71 | 92 | 38 | Syria | 0 | 6 | 29 | 63 |
| 18 | Ukraine | 6 | 29 | 64 | 88 | 39 | Tunisia | 0 | 5 | 30 | 72 |

| | | | | | | | | | | | |
|--|----------------|----|----|----|----|----|----------------------|----------|-----------|-----------|-----------|
| 19 | Iran | 5 | 21 | 50 | 79 | 40 | Indonesia | 0 | 3 | 19 | 54 |
| 20 | UAE | 4 | 19 | 47 | 75 | 41 | Morocco | 0 | 2 | 13 | 39 |
| 21 | Italy | 4 | 27 | 65 | 90 | 42 | Ghana | 0 | 1 | 6 | 22 |
| | | | | | | | International median | 4 | 21 | 52 | 79 |
| Participating countries in grade nine | | | | | | | | | | | |
| 1 | South Africa | 1 | 4 | 11 | 25 | 3 | Honduras | 0 | 1 | 9 | 35 |
| 2 | Botswana | 1 | 6 | 26 | 55 | | | | | | |
| Other participations | | | | | | | | | | | |
| 1 | Massachusetts | 24 | 61 | 87 | 96 | 8 | Indiana / USA | 10 | 43 | 78 | 95 |
| 2 | Minnesota / | 16 | 54 | 85 | 98 | 9 | Dubai / UAE | 7 | 28 | 57 | 79 |
| 3 | Colorado / | 14 | 48 | 80 | 96 | 10 | California / | 6 | 28 | 62 | 88 |
| 4 | Connecticut / | 14 | 45 | 74 | 92 | 11 | Ontario / | 6 | 35 | 76 | 96 |
| 5 | Florida / USA | 13 | 42 | 74 | 93 | 12 | Quebec / | 5 | 34 | 76 | 96 |
| 6 | Carolina / USA | 12 | 42 | 75 | 94 | 13 | Alabama / | 5 | 24 | 56 | 83 |
| 7 | Alberta / | 12 | 48 | 85 | 98 | 14 | Abu Dhabi / | 4 | 17 | 45 | 74 |

Table (22)

Performance Averages of Participating Arab Countries in Science

| | Country | Advanced (625) | High (550) | Moderate(475) | Low (400) |
|-----------|----------------------|-----------------------|-------------------|----------------------|------------------|
| 1 | United Arab Emirates | 4 | 19 | 47 | 75 |
| 2 | Bahrain | 3 | 17 | 44 | 70 |
| 3 | Qatar | 3 | 14 | 34 | 58 |
| 4 | Jordan | 2 | 15 | 45 | 72 |
| 5 | Oman | 2 | 11 | 34 | 59 |
| 6 | Palestine | 1 | 10 | 33 | 59 |
| 7 | Lebanon | 1 | 7 | 25 | 54 |
| 8 | Saudi Arabia | 1 | 8 | 33 | 68 |
| 9 | Syria | 0 | 6 | 29 | 63 |
| 10 | Tunisia | 0 | 5 | 30 | 72 |
| 11 | Morocco | 0 | 2 | 13 | 39 |
| | Dubai / UAE | 7 | 28 | 57 | 79 |
| | Abu Dhabi / UAE | 4 | 17 | 45 | 74 |

| | | | | | |
|--|----------------------|----------|-----------|-----------|-----------|
| | Arab median | 2 | 11 | 34 | 68 |
| | International median | 4 | 21 | 52 | 79 |

Level of Performance in the Science Test by Gender

Table (23) shows the performance averages in science test by gender for all countries, and Table (24) shows the performance averages of the participating Arab countries by gender.

Table (23)

Performance Averages in Science for the Participating Countries in (TIMSS 2011) by Gender

| Rank | Country | Performance Average | | Absolute difference | Rank | Country | Performance Average | | Absolute difference |
|-----------|------------|---------------------|-------|---------------------|-----------|--------------|---------------------|------------|---------------------|
| | | Females | Males | | | | Females | Males | |
| 1 | Taiwan | 564 | 564 | 0(3.0) | 24 | Malaysia | 434 | 419 | 15(5.5) |
| 2 | Norway | 495 | 494 | 1(3.4) | 25 | Thailand | 458 | 443 | 15(4.9) |
| 3 | Singapore | 589 | 591 | 1(4.1) | 26 | Italy | 493 | 508 | 15(2.8) |
| 4 | Hong Kong | 536 | 534 | 2(4.6) | 27 | Chile | 454 | 470 | 16(3.6) |
| 5 | Romania | 466 | 464 | 2(3.4) | 28 | Turkey | 491 | 475 | 16(3.2) |
| 6 | England | 534 | 532 | 2(5.6) | 29 | Australia | 511 | 527 | 16(5.9) |
| 7 | Sweden | 511 | 508 | 3(3.0) | 30 | Tunisia | 431 | 447 | 17(2.6) |
| 8 | Morocco | 378 | 374 | 4(3.0) | 31 | Macedonia | 417 | 399 | 18(4.7) |
| 9 | Kazakhstan | 492 | 488 | 4(3.6) | 32 | Hungary | 513 | 531 | 18(3.7) |
| 10 | Lebanon | 404 | 408 | 4(6.7) | 33 | Armenia | 446 | 428 | 18(3.4) |
| 11 | Slovenia | 541 | 545 | 4(3.4) | 34 | New Zealand | 501 | 522 | 20(3.9) |
| 12 | Ukraine | 499 | 503 | 4(4.1) | 35 | UAE | 477 | 452 | 25(4.2) |
| 13 | Korea | 558 | 563 | 5(3.1) | 36 | Qatar | 432 | 406 | 26(10.7) |
| 14 | Finland | 555 | 550 | 5(2.7) | 37 | Saudi Arabia | 450 | 424 | 26(7.2) |
| 15 | Iran | 477 | 472 | 5(7.0) | 38 | Palestine | 434 | 406 | 27(6.8) |
| 16 | Syria | 424 | 429 | 6(5.2) | 39 | Ghana | 290 | 320 | 30(4.0) |
| 17 | Russia | 539 | 546 | 7(2.9) | 40 | Jordan | 471 | 428 | 43(7.6) |

| | | | | | | | | | |
|----------------------|---------------------|-----|-----|----------------|----|--------------------|------------|------------|----------------|
| 18 | Israel | 519 | 512 | 7(4.2) | 41 | Bahrain | 482 | 423 | 59(4.4) |
| 19 | Indonesia | 409 | 402 | 7(3.6) | 42 | Oman | 458 | 380 | 78(4.9) |
| 20 | Japan | 554 | 562 | 8(3.3) | 43 | The international | 480 | 474 | 6 (0.9) |
| 21 | Lithuania | 518 | 510 | 8(3.3) | 44 | South Africa | 335 | 328 | 7(4.5) |
| 22 | Georgia | 425 | 415 | 10(3.4) | 45 | Botswana | 410 | 399 | 11(3.6) |
| 23 | United States | 519 | 530 | 11(2.4) | 46 | Honduras | 360 | 380 | 20(3.8) |
| Other participations | | | | | | | | | |
| 1 | Ontario / Canada | 521 | 522 | 1(2.7) | 8 | Colorado / America | 537 | 548 | 11(4.5) |
| 2 | Connecticut / USA | 530 | 533 | 3(5.1) | 9 | Carolina / Latino | 526 | 537 | 12(4.7) |
| 3 | Quebec / Canada | 518 | 522 | 4(3.0) | 10 | California / USA | 493 | 504 | 12(4.0) |
| 4 | Alberta / Canada | 542 | 549 | 6(2.5) | 11 | Minnesota / USA | 548 | 559 | 12(3.8) |
| 5 | Abu Dhabi / UAE | 465 | 458 | 6(6.9) | 12 | Florida / USA | 522 | 537 | 15(6.8) |
| 6 | Massachusetts / USA | 564 | 570 | 7(3.6) | 13 | Indiana / USA | 526 | 541 | 15(4.0) |
| 7 | Alabama / America | 482 | 489 | 7(4.0) | 14 | Dubai / UAE | 500 | 472 | 28(9.3) |

The difference written in bold font is statistically significant at $\alpha = 0.05$

The difference written in regular font is not statistically significant at $\alpha = 0.05$

Table (24)

**Performance Averages in Science for the
Participating Arab Countries in (TIMSS 2011) by Gender**

| Rank | Country | Performance | | Absolute difference | Rank | Country | Performance | | Absolute difference |
|------|-----------|-------------|-------|---------------------|------|---------------|-------------|------------|---------------------|
| | | Females | Males | | | | | | |
| 1 | Morocco | 378 | 374 | 4(3.0) | 9 | Jordan | 471 | 428 | 43(7.6) |
| 2 | Lebanon | 404 | 408 | 4(6.7) | 10 | Bahrain | 482 | 423 | 59(4.4) |
| 3 | Syria | 424 | 429 | 6(5.2) | 11 | Oman | 458 | 380 | 78(4.9) |
| 4 | Tunisia | 431 | 447 | 17(2.6) | | Abu Dhabi / | 465 | 458 | 6(6.9) |
| 5 | UAE | 477 | 452 | 25(4.2) | | Dubai / UAE | 500 | 472 | 28(9.3) |
| 6 | Qatar | 432 | 406 | 26(10.7) | | | | | |
| 7 | Saudi | 450 | 424 | 26(7.2) | | Arab average | 440 | 416 | 24(5.1) |
| 8 | Palestine | 434 | 406 | 27(6.8) | | International | 480 | 474 | 6(0.9) |

The difference written in bold font is statistically significant at $\alpha = 0.05$

The difference written in regular font is not statistically significant at $\alpha = 0.05$

At the international level, the males' average is (474), while the females' average is (480), and the difference between both averages is (6) scores and this difference is statistically significant in favor of females. At the Arab level, the males' average is (416), and the females' average is (440). The difference between both averages is (24) scores and, and is statistically significant in favor of females . At Jordan's level, the females' average was is (471) and the males' average was (428); and so, the difference between both averages is (43) in favor of females and this difference is statistically significant. The excellence of females over males in the Jordanian educational system has become a serious issue that needs to be discussed to identify its reasons, whether they are attributed to social factors, or that the females' schools are better than males' school. There is urgent need to review these factors to improve the males' performance levels to reach the females' performance levels.

Level of Performance in the Science Test by Content Domains

Table (25) shows the averages performance of the Arab countries by content domains of the science test. The performance average of Jordan in the content domain is as follows: Biology (446), Chemistry (463), Physics (446), Earth Sciences (436). These averages are higher than the similar Arab averages with statistical significance. The averages of Arab performance are as follows: Biology (424), Chemistry (430), Physics (427), Earth Sciences (419). These averages are all below the international average, which is (466) in all domains. When comparing the performance average of Jordan with the international averages by content domains, it is noted that the Jordanian average is lower than the international average in the four content domains (biology, chemistry, physics, earth sciences).

Table (25)

Arab Countries Averages in Science by Content

| Country | Biology | | Physics | | Chemistry | | Earth Sciences | |
|--------------|------------|--------------|------------|--------------|------------|--------------|----------------|--------------|
| Emirates | 463 | (2.4) | 464 | (2.2) | 461 | (2.3) | 466 | (2.5) |
| Bahrain | 449 | (2.1) | 448 | (2.7) | 457 | (1.8) | 451 | (1.8) |
| Jordan | 447 | (4.3) | 463 | (4.4) | 446 | (4.2) | 436 | (4.2) |
| Tunisia | 449 | (3.0) | 434 | (3.3) | 436 | (3.7) | 421 | (3.3) |
| Saudi Arabia | 430 | (4.5) | 428 | (4.4) | 437 | (4.2) | 441 | (3.5) |
| Syria | 425 | (4.3) | 424 | (3.7) | 426 | (4.4) | 414 | (4.8) |
| Palestine | 407 | (3.9) | 432 | (4.0) | 432 | (3.8) | 406 | (3.3) |

| | | | | | | | | |
|----------------------------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|
| Oman | 407 | (3.6) | 408 | (3.5) | 427 | (3.3) | 431 | (3.0) |
| Qatar | 411 | (4.2) | 416 | (4.1) | 426 | (3.8) | 408 | (3.8) |
| Lebanon | 395 | (5.2) | 435 | (5.3) | 405 | (5.4) | 365 | (6.4) |
| Morocco | 378 | (3.0) | 374 | (2.2) | 349 | (2.5) | 377 | (3.3) |
| The international average | 467 | (0.6) | 469 | (0.6) | 467 | (0.6) | 466 | (0.6) |
| Arab average | 424 | (1.1) | 430 | (1.1) | 427 | (1.1) | 419 | (1.1) |

Level of Performance in the Science Test by Cognitive Domains

Table (26) shows the averages performance of the Arab countries by the cognitive domains in science. The performance average of Jordan in the cognitive domains are as follows: knowing (453), applying (451), and reasoning (441). These averages are higher than the similar Arab averages and with statistical significance. The Arab performance averages are as follows: knowing (428), applying (428) and reasoning (420). These averages are all below the similar international averages which are (469), (468), (467), respectively.

Comparing the Jordan's performance average with the international averages by cognitive domains shows that Jordan's performance average is below the international averages with statistical significance.

Table (26)

Arab Countries Averages in Science by cognitive domain in science

| Country | Knowing | | Applying | | Reasoning | |
|---------------------------|------------|--------------|------------|--------------|------------|--------------|
| Emirates | 471 | (2.5) | 464 | (2.1) | 456 | (2.6) |
| Bahrain | 457 | (3.6) | 450 | (2.0) | 449 | (1.9) |
| Jordan | 453 | (4.3) | 451 | (4.0) | 441 | (4.5) |
| Tunisia | 424 | (2.3) | 437 | (2.2) | 446 | (2.7) |
| Saudi Arabia | 448 | (4.4) | 432 | (3.9) | 424 | (3.5) |
| Syria | 441 | (4.3) | 426 | (4.4) | 402 | (5.1) |
| Palestine | 431 | (3.6) | 422 | (3.6) | 404 | (3.6) |
| Oman | 416 | (3.4) | 419 | (3.3) | 417 | (3.0) |
| Qatar | 418 | (4.3) | 420 | (3.5) | 409 | (4.4) |
| Lebanon | 381 | (5.8) | 408 | (5.2) | 408 | (5.6) |
| Morocco | 363 | (2.7) | 381 | (1.9) | 366 | (2.3) |
| The international average | 469 | (0.6) | 468 | (0.6) | 467 | (0.6) |
| Arab average | 428 | (1.1) | 428 | (1.1) | 420 | (1.1) |

Relative Difficulty of Science by Content Domain and by Cognitive Domain.

Table (27) shows the percentages averages of correct answers in science by content and by cognitive domains of science.

Jordan's averages by content are as follows: Biology (37%), chemistry (41%), physics (33%), and earth sciences (38%). These percentages reflect varying degree of difficulty by content, and the content of science can be ordered by the degree of difficulty at students starting from the most difficult to the easiest as follows: Physics, biology, earth sciences, chemistry. It should be noted that these percentages are below the similar percentages at the international level but are higher than the similar Arab percentage averages.

Table (27)

Average Percentages of Correct Answers in Science by Content and Cognitive Domains for the Arab Countries

| Country | | Science | Science Content Domains | | | | Science Cognitive Domains | | |
|-----------------------|--------------|----------------|-------------------------|----------------|----------------|----------------|---------------------------|----------------|----------------|
| International Average | | 42(0.1) | Biology | Chemistry | Physics | Earth Sciences | Knowing | Applying | Reasoning |
| 1 | Emirates | 39(0.4) | 40(0.4) | 41(0.5) | 35(0.4) | 43(0.5) | 48(0.4) | 38(0.4) | 29(0.5) |
| 2 | Bahrain | 38(0.3) | 38(0.3) | 39(0.4) | 34(0.4) | 40(0.4) | 46(0.4) | 36(0.3) | 29(0.3) |
| 3 | Jordan | 37(0.6) | 37(0.6) | 41(0.7) | 33(0.6) | 38(0.7) | 46(0.7) | 36(0.7) | 27(0.6) |
| 4 | Qatar | 34(0.5) | 33(0.7) | 35(0.6) | 32(0.5) | 36(0.5) | 42(0.6) | 33(0.5) | 24(0.7) |
| 4 | Saudi Arabia | 34(0.6) | 33(0.6) | 34(0.7) | 31(0.6) | 37(0.7) | 44(0.6) | 32(0.7) | 23(0.6) |
| 6 | Palestine | 33(0.5) | 32(0.5) | 37(0.5) | 33(0.6) | 33(0.6) | 43(0.5) | 32(0.6) | 22(0.4) |
| 6 | Oman | 33(0.4) | 33(0.4) | 33(0.4) | 31(0.3) | 37(0.4) | 41(0.3) | 32(0.4) | 24(0.4) |
| 6 | Tunisia | 33(0.4) | 36(0.4) | 32(0.5) | 29(0.5) | 32(0.4) | 38(0.4) | 32(0.4) | 26(0.5) |
| Arab Average | | 33(0.2) | 34(0.2) | 35(0.2) | 30(0.2) | 35(0.2) | 42 (0.2) | 32(0.2) | 24(0.2) |
| 9 | Syria | 32(0.6) | 34(0.6) | 33(0.6) | 28(0.7) | 33(0.7) | 42(0.6) | 32(0.6) | 20(0.7) |
| 10 | Lebanon | 29(0.7) | 29(0.7) | 35(0.9) | 28(0.7) | 27(0.7) | 36(0.7) | 29(0.7) | 21(0.8) |
| 11 | Morocco | 25(0.2) | 26(0.3) | 26(0.3) | 20(0.2) | 28(0.3) | 32(0.2) | 24(0.3) | 16(0.3) |
| | Dubai | 43(0.4) | 44(0.5) | 45(0.5) | 39(0.4) | 47(0.6) | 51(0.4) | 42(0.5) | 34(0.4) |
| | Abu Dhabi | 38(0.7) | 39(0.7) | 40(0.7) | 34(0.7) | 42(0.9) | 47(0.7) | 38(0.7) | 29(0.8) |

Regarding the cognitive domain, Jordan's percentages are (46%) in the knowing domain, (36%) in the applying domain, and (27%) in the scientific reasoning and thinking domain. These percentages show an order of these areas by difficulty (from the most difficult to the easiest) as follows: reasoning, applying, and knowing. However, this order is the same on the Arab and

international levels. It should be noted that the Jordanian percentages are below the similar international percentages but are higher than all of the similar Arab percentages.

Jordan's Performance Levels by Content and by Gender

Table (28) shows that females' performance averages in science is (43) scores higher than the males' performance averages and this difference is statistically significant.

Table (28)

Averages of Jordanian Students Performance in Science by Content and Gender

| Content | Males | Females | Absolute Difference |
|-----------------------|--------------|----------------|----------------------------|
| Biology | 424(6.6) | 472(4.6) | 48(7.7)* |
| Physics | 439(6.7) | 487(4.7) | 48(7.9)* |
| Chemistry | 430(6.4) | 463(5.1) | 34(8.2)* |
| Earth Sciences | 418(6.5) | 455(5.0) | 37(8.3)* |
| Science | 428(6.4) | 471(4.3) | 43(7.7)* |

* The difference is statistically significant at ($\alpha = 0.05$)

As table (28) shows, the differences between females' performance average and males' performance average in content (biology, chemistry, physics and earth sciences) are (48, 48, 34, 37) scores respectively and in favor of females and these differences are all statistically significant.

Jordan's Performance Levels by Cognitive domain and by Gender

Table (29) shows that the differences between the female' performance averages and males' performance averages in the scientific knowledge domains (knowing, applying, and reasoning) are (48, 37, 46) scores respectively and in favor of females, and these differences are all statistically significant.

Table (29)

Averages of Jordanian Students Performance in Science by Cognitive Domains and Gender

| Domain | Males | Females | Absolute Difference |
|------------------|-----------------|-----------------|----------------------------|
| knowing | 429(6.5) | 478(4.9) | 48(7.9)* |
| Applying | 433(6.3) | 470(4.2) | 37(7.3)* |
| Reasoning | 419(7.1) | 465(4.9) | 46(8.7)* |
| Science | 428(6.4) | 471(4.3) | 43(7.7)* |

* The difference is statistically significant at ($\alpha = 0.05$)

Jordan's Performance Levels by Content and by School's Location

Table (30) shows that the performance average of students in the urban areas is (35) scores higher than the performance average of students in the rural areas and this difference is statistically significant.

Table (30)

Averages of Jordanian Students Performance in Science by Content and School Location

| Content | Rural areas | Urban areas | Absolute Difference |
|----------------|-----------------|-----------------|---------------------|
| Biology | 421(9.9) | 455(4.6) | 34(10.9)* |
| Chemistry | 436(10.4) | 470(4.7) | 34(11.3)* |
| Physics | 422(9.8) | 453(4.4) | 31(10.6)* |
| Earth Sciences | 411(9.5) | 443(4.3) | 32(10.1)* |
| Science | 422(8.8) | 457(4.3) | 35(9.9)* |

* The difference is statistically significant at ($\alpha = 0.05$)

Table (30) shows that the differences between the performance averages of students in urban areas and the performance average of students in rural areas by content (biology, chemistry, physics, and earth sciences) are (34, 34, 31, 32) scores respectively, in favor of students in the urban areas and these differences are statistically significant.

Jordan's Performance Levels by Cognitive domain and by School's Location

Table (31) indicates that the differences between the performance averages of students in the urban areas and the performance averages of students in the rural areas in the cognitive domains of science (knowing, applying, reasoning) are (33, 31, 36) scores respectively, in favor of students in the urban areas and these differences are statistically significant.

Table (31)

Averages of Jordanian Students Performance in Science by Cognitive Domains and School Location

| Cognitive Domains | Rural areas | Urban areas | Absolute Difference |
|-------------------|-----------------|-----------------|---------------------|
| knowing | 428(9.8) | 460(4.6) | 33(10.7)* |
| Applying | 427(8.9) | 458(4.4) | 31(9.9)* |
| Reasoning | 413(10.3) | 449(4.7) | 36(11.3)* |
| Science | 422(8.8) | 457(4.3) | 35(9.9)* |

Jordan's Performance Levels by Content and by Authority

Table (32) shows the performance averages in science and content domains by authority. The authorities were ordered by the performance averages starting from the highest to the lowest as follows: Private education, the UNRWA, then the Ministry of Education. Table (33) shows the differences between these averages and their statistical significance as all differences reached the statistical significance level $\alpha = 0.05$.

Table (32)

Averages of Jordanian Students Performance in Science by Content and Authority

| Content | Ministry of Education | Private Education | UNRWA |
|----------------|-----------------------|-------------------|----------|
| Biology | 434(5.1) | 505(9.6) | 479(5.5) |
| Chemistry | 449(5.3) | 522(9.8) | 496(5.5) |
| Physics | 433(4.9) | 501(9.6) | 479(5.6) |
| Earth Sciences | 423(4.9) | 493(9.6) | 466(5.8) |
| Science | 436(4.8) | 505(9.5) | 482(5.6) |

* The difference is statistically significant at ($\alpha = 0.05$)

Table (33)

Differences between Performance Averages by Content and Authority

| Science | Supervising Authority | Ministry of Education | Private Education | UNRWA |
|----------------|-----------------------|-----------------------|-------------------|-------|
| Biology | Ministry of Education | – | – | – |
| | Private Education | 71(10.9)* | – | – |
| | UNRWA | 45(7.3)* | 27(11.0)* | – |
| Chemistry | Ministry of Education | – | – | – |
| | Private Education | 72(11.1)* | – | – |
| | UNRWA | 46(7.4)* | 26(10.7)* | – |
| Physics | Ministry of Education | – | – | – |
| | Private Education | 68(10.9)* | – | – |
| | UNRWA | 46(7.0)* | 23(10.9)* | – |
| Earth Sciences | Ministry of Education | – | – | – |
| | Private Education | 70(10.8)* | – | – |
| | UNRWA | 43(7.2)* | 27(10.5)* | – |
| Science | Ministry of Education | – | – | – |
| | Private Education | 70(10.7)* | – | – |
| | UNRWA | 46(7.0)* | 23(10.8)* | – |

* The difference is statistically significant at ($\alpha = 0.05$)

Jordan's Performance Levels by Cognitive Domain and by Authority

Table (34) shows the performance averages in the cognitive domains of science by the supervising authority. The authorities were ordered by the performance averages starting from the highest to the lowest as follows: Private education, UNRWA, then the Ministry of Education. Table (33) shows the differences between these averages and their statistical significance as all differences reached the statistical significance level $\alpha = 0.05$.

Table (34)

Averages of Jordanian Students Performance in Science by Cognitive Domains and Supervising Authority

| Cognitive Domains | Ministry of Education | Private Education | UNRWA |
|-------------------|-----------------------|-------------------|----------|
| Knowing | 440(5.2) | 507(10.2) | 490(5.7) |
| Applying | 438(4.8) | 505(9.1) | 480(4.8) |
| Reasoning | 427(5.3) | 503(9.4) | 473(5.7) |
| Science | 436(4.8) | 505(9.5) | 482(5.6) |

Table (35)

Differences between Performance Averages by Cognitive Domains and Supervising Authority

| Cognitive | Supervising | Ministry of Education | Private Education | UNRWA |
|-------------|-----------------------|-----------------------|-------------------|-------|
| Knowledge | Ministry of Education | – | – | – |
| | Private Education | 67(11.6)* | – | – |
| | UNRWA | 50(7.0)* | 16(11.5) | – |
| Application | Ministry of Education | – | – | – |
| | Private Education | 67(10.3)* | – | – |
| | UNRWA | 41(6.2)* | 25(10.3)* | – |
| Reasoning | Ministry of Education | – | – | – |
| | Private Education | 76(10.9)* | – | – |
| | UNRWA | 45(7.6)* | 30(11.0)* | – |
| Science | Ministry of Education | – | – | – |
| | Private Education | 70(10.7)* | – | – |
| | UNRWA | 46(7.0)* | 23(10.8)* | – |

* The difference is statistically significant at ($\alpha = 0.05$)

Jordan's Performance Levels by Content and by Project

Table (36) shows the performance averages in science by content and project. The projects are ordered by the performance averages starting from the highest to the lowest as follows: discovery schools, Education Reform Support Project (ERSP), Madrasati, and the Ministry of Education schools that have no projects. The same order remained in the all science contents. Table (37) shows the significant differences between these averages.

Table (36)

Averages of Jordanian Students Performance in Science by Content and Project

| Content | Discovery schools | Madrasati | Ministry of Education | (ERSP) |
|-----------------------|-------------------|-----------------|-----------------------|-----------------|
| Biology | 468(9.2) | 433(8.1) | 431(6.0) | 461(3.3) |
| Chemistry | 482(9.5) | 448(7.6) | 446(6.2) | 475(3.3) |
| Physics | 465(8.9) | 435(7.6) | 430(5.9) | 455(4.3) |
| Earth Sciences | 455(8.7) | 422(7.8) | 419(5.8) | 445(3.3) |
| Science | 469(8.3) | 434(7.9) | 433(5.7) | 461(2.6) |

Table (37)

Differences between Performance Averages by Content and Project

| Science Content | Project | Discovery schools | Madrasati | Ministry of Education | (ERSP) |
|-----------------------|-----------------------|-------------------|-----------|-----------------------|--------|
| Biology | Discovery schools | - | - | - | - |
| | Madrasati | 35(12.2)* | - | - | - |
| | Ministry of Education | 37(10.9)* | 2(9.9) | - | - |
| | (ERSP) | 7(9.8) | 28(8.5)* | 30(6.8)* | - |
| Chemistry | Discovery schools | - | - | - | - |
| | Madrasati | 33(12.2)* | - | - | - |
| | Ministry of Education | 36(11.4)* | 3(9.7) | - | - |
| | (ERSP) | 7(9.9) | 26(8.3)* | 29(7.0)* | - |
| Physics | Discovery schools | - | - | - | - |
| | Madrasati | 30(11.6)* | - | - | - |
| | Ministry of Education | 35(10.7)* | 5(9.6) | - | - |
| | (ERSP) | 10(9.7) | 20(8.7)* | 26(7.1)* | - |
| Earth Sciences | Discovery schools | - | - | - | - |
| | Madrasati | 33(11.6)* | - | - | - |
| | Ministry of Education | 35(10.1)* | 2(9.8) | - | - |
| | (ERSP) | 10(9.2)* | 23(8.5)* | 26(6.7)* | - |
| Science | Discovery schools | - | - | - | - |
| | Madrasati | 35(11.5)* | - | - | - |

| | | | | | |
|--|-----------------------|-----------|----------|----------|--|
| | Ministry of Education | 36(10.1)* | 1(9.7) | - | |
| | (ERSP) | 8(8.6) | 27(8.3)* | 28(6.3)* | |

* The difference is statistically significant at ($\alpha = 0.05$)

Jordan's Performance Levels by Cognitive Domain and by Project

Table (38) shows the performance averages in science by the cognitive domain and the project. The projects are ordered by the performance averages starting from the highest to the lowest as follows: discovery schools, Education Reform Support Project (ERSP), Madrasati, and the Ministry of Education that have no projects. Table (39) shows the significant of differences among these averages. In general, the differences between Madrasati and the Ministry of Education are not significant, as well as the differences between discovery schools, and the Education Reform Support Project (ERSP). However, the differences were statistically significant between the discovery schools on the one hand and Madrasati or the Ministry of Education on the other hand. The differences between Education Reform Support Project (ERSP) on one hand and Madrasati or the Ministry of Education on the other hand were also statistical significance.

Table (38)
Averages of Jordanian Students Performance in Science by Cognitive Domains and Project

| Cognitive Domains | Exploratory schools | Madrasati | Ministry of Education | (ERSP) |
|-------------------|---------------------|-----------------|-----------------------|-----------------|
| Knowing | 473(9.8) | 439(8.4) | 436(6.0) | 467(3.6) |
| Applying | 468(8.5) | 438(7.5) | 435(5.7) | 462(3.2) |
| Reasoning | 462(9.1) | 427(8.3) | 424(6.4) | 454(3.7) |
| Science | 469(8.3) | 434(7.9) | 433(5.7) | 461(2.6) |

Table (39)
Differences between Performance Averages by Cognitive Domains and Project

| Cognitive Domain Content | Project | Discovery schools | Madrasati | Ministry of Education | (ERSP) |
|--------------------------|-----------------------|-------------------|-----------|-----------------------|--------|
| Knowing | Discovery schools | - | - | - | - |
| | Madrasati | 34(12.6)* | - | - | - |
| | Ministry of Education | 37(11.5)* | 3(10.1) | - | - |
| | (ERSP) | 6(10.1) | 28(8.8)* | 31(6.9) | - |
| Applying | Discovery schools | - | - | - | - |
| | Madrasati | 30(11.3)* | - | - | - |
| | Ministry of Education | 33(10.2)* | 3(9.3) | - | - |

| | | | | | |
|-----------|-----------------------|-----------|----------|----------|---|
| | (ERSP) | 6(8.9) | 24(8.1)* | 26(5.5)* | - |
| Reasoning | Discovery schools | - | - | - | - |
| | Madrasati | 35(12.3)* | - | - | - |
| | Ministry of Education | 38(11.3)* | 3(10.5) | - | |
| | (ERSP) | 8(9.6) | 27(9.1)* | 30(7.7)* | - |
| Science | Discovery schools | - | - | - | - |
| | Madrasati | 35(11.4)* | - | - | - |
| | Ministry of Education | 36(10.1)* | 1(9.7) | - | |
| | (ERSP) | 8(8.6) | 27(8.3)* | 28(6.3)* | - |

* The difference is statistically significant at ($\alpha = 0.05$)

Chapter Three

Performance on the Math Test

Table (40) shows the overall performance averages of the students in the participating countries in the math test. These results indicate that Jordan ranked (35) among the (45) participating countries. Jordan's performance average is (24) scores below the international average and Jordan ranked six among the Arab countries participating in the study.

Table (41) shows the performance averages of the Arab countries participating in the study, as Figure (2) shows the performance average of the Arab countries in math. It should be noted that the performance averages of students in Jordan in math was equal to the Arab average.

On the Arab level, Jordanian performance in math for this cycle is unsatisfactory and is below the international average as Jordan's rank declined from second in the 2007 cycle, to sixth in the 2011 cycle. It seems that there is an urgent need to review the curriculum and the teaching methods to enhance the strengths and address the weaknesses to improve the performance of our students up to the international level.

Table (40)

Performance Averages of Participating Countries in Math in (TIMSS 2011)

| | Country | Average | | Country | Average |
|----|---------------|---------|----|----------------------|---------|
| 1 | Korea | 613 ▲ | 23 | United Arab Emirates | 456 ▲ |
| 2 | Singapore | 611 ▲ | 24 | Turkey | 452 ▲ |
| 3 | Taiwan | 609 ▲ | 25 | Lebanon | 449 ▲ |
| 4 | Hong Kong | 586 ▲ | 26 | Malaysia | 440 ▲ |
| 5 | Japan | 570 ▲ | 27 | Georgia | 431 ▲ |
| 6 | Russia | 539 ▲ | 28 | Thailand | 427 ▲ |
| 7 | Israel | 516 ▲ | 29 | Macedonia | 426 ▲ |
| 8 | Finland | 514 ▲ | 30 | Tunisia | 425 ▲ |
| 9 | United States | 509 ▲ | 31 | Chile | 416 ▲ |
| 10 | England | 507 ▲ | 32 | Iran | 415 |
| 11 | Hungary | 505 ▲ | 33 | Qatar | 410 |
| 12 | Australia | 505 ▲ | 34 | Bahrain | 409 |
| 13 | Slovenia | 505 ▲ | 35 | Jordan | 406 |
| 14 | Lithuania | 502 ▲ | 36 | Palestine | 404 |
| 15 | Italy | 498 ▲ | 37 | Saudi Arabia | 394 ▼ |
| 16 | New Zealand | 488 ▲ | 38 | Indonesia | 386 ▼ |

| | | | | | |
|-----------------------------|---------------------------|--|----|------------------|--|
| 17 | Kazakhstan | 487 ▲ | 39 | Syria | 380 ▼ |
| 18 | Sweden | 484 ▲ | 40 | Morocco | 371 ▼ |
| 19 | Ukraine | 479 ▲ | 41 | Oman | 366 ▼ |
| 20 | Norway | 475 ▲ | 42 | Ghana | 331 ▼ |
| 21 | Armenia | 467 ▲ | 43 | Botswana | 397 ▼ |
| | The international average | 467 ▲ | 44 | South Africa | 352 ▼ |
| 22 | Romania | 458 ▲ | 45 | Honduras | 338 ▼ |
| Other participations | | | | | |
| 1 | Massachusetts / USA | 561 ▲ | 8 | Florida / USA | 513 ▲ |
| 2 | Minnesota / USA | 545 ▲ | 9 | Ontario / Canada | 512 ▲ |
| 3 | Carolina / USA | 537 ▲ | 10 | Alberta / Canada | 505 ▲ |
| 4 | Quebec / Canada | 532 ▲ | 11 | California / USA | 493 ▲ |
| 5 | Indiana / USA | 522 ▲ | 12 | Dubai / UAE | 478 ▲ |
| 6 | Colorado / USA | 518 ▲ | 13 | Alabama / USA | 466 ▲ |
| 7 | Connecticut / USA | 518 ▲ | 14 | Abu Dhabi / UAE | 449 ▲ |

| | |
|--------------------------------------|--------------------------------------|
| Average higher than Jordan's Average | ▲ |
| Average similar to Jordan's Average | |
| Average lower than Jordan's Average | ▼ |

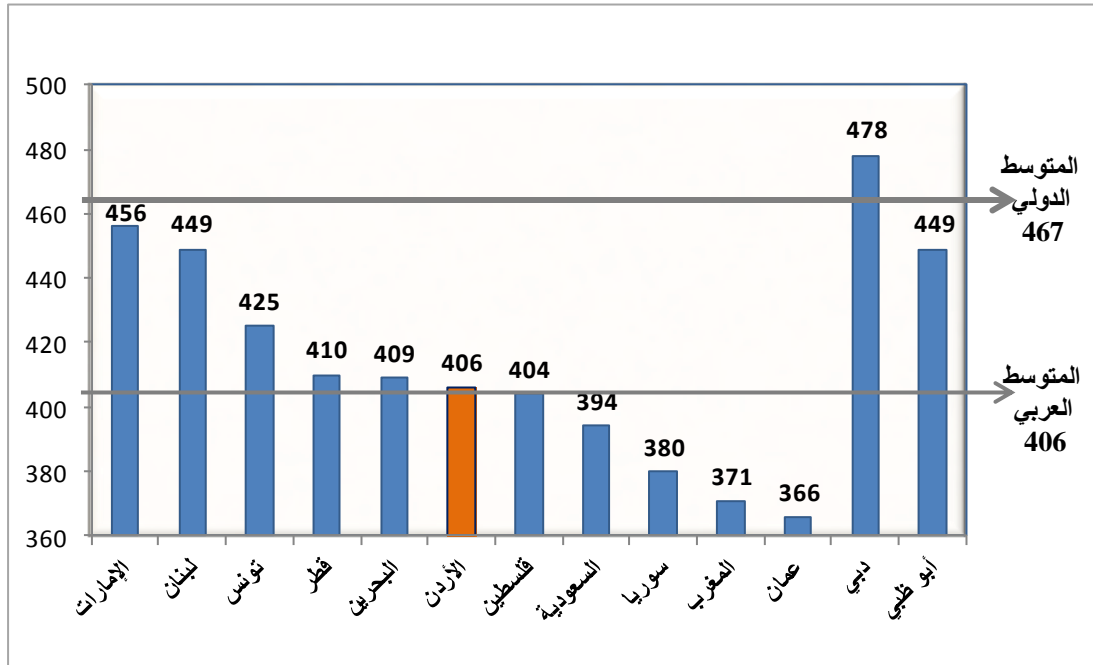
Table (41)

Performance Averages of Participating Arab Countries in Math in (TIMSS 2011)

| | Country | |
|-----------|---------------------------|--|
| | The international average | 467 ▲ |
| 1 | United Arab Emirates | 456 ▲ |
| 2 | Lebanon | 449 ▲ |
| 3 | Tunisia | 425 ▲ |
| 4 | Qatar | 410 |
| 5 | Bahrain | 409 |
| 6 | Jordan | 406 |
| 7 | Arab average | 406 |
| 8 | Palestine | 404 |
| 9 | Saudi Arabia | 394 ▼ |
| 10 | Syria | 380 ▼ |
| 11 | Morocco | 371 ▼ |
| 12 | Oman | 366 ▼ |
| | Dubai / UAE | 478 ▲ |
| | Abu Dhabi / UAE | 449 ▲ |

Figure (2)

Performance Averages of the Arab Countries in Math



Performance in the math Test by International Achievement Levels

The international study identifies the following four achievement levels:

- Advanced achievement level in math, representing students who got 625 scores or more.
- High achievement level in math, representing students who got 550 scores or more.
- Moderate achievement levels in math, representing students who got 475 scores or more.
- Low Achievement Levels in math, representing students who got 400 scores or more.

It should be noted that these levels are cumulative, i.e., students who reach a certain level, have already reached the levels below it. In other words, student who reached the high achievement level, have already reached the moderate and low levels, but were unable to reach the advanced level.

Advanced achievement level:


Students who reached the advanced achievement level are able to:

Organize information and make generalizations, explain the solution strategies in problems that are related to non-routine situations. They are also able to organize information and make generalizations to solve problems, and apply the knowledge concerning numerical, geometry and algebra relations leading to the solution of issues (for example, relationships between fractions and decimals, and percentages and geometry properties, and algebra laws), as well as the ability to create equal formulas to algebra laws. Students who reach this level are able to:

- Solve non-routine issues.
- Resolve math problems that need more than one step.
- Solve verbal problems involving inverse operations.
- Reach conclusions and justify them.

The following example shows a sample of the questions that most students who reached this level answered it correctly.

An example of a question answered by most students reaching the advanced achievement level in Math

| Country | Percentage of Correct Answers | | | Content Domain: Geometry | |
|------------|-------------------------------|-------|---|--|--|
| | | | | Knowledge Domain: Reasoning | |
| | | | | Description: To resolve a verbal problem on filling a three dimensional box of the cuboids shape | |
| Taiwan | 66 | (1.8) | ▲ | Radi fills books of the same size in a box of the cuboids shape What is the biggest number of books that can be placed inside the box? Answer: 12  | |
| Hong Kong | 65 | (2.1) | ▲ | | |
| Korea | 62 | (2.0) | ▲ | | |
| Singapore | 60 | (1.9) | ▲ | | |
| Japan | 58 | (1.8) | ▲ | | |
| Russia | 36 | (2.6) | ▲ | | |
| Israel | 34 | (2.4) | ▲ | | |
| Kazakhstan | 33 | (2.5) | ▲ | | |
| Lithuania | 30 | (2.0) | ▲ | | |
| Australia | 29 | (2.3) | ▲ | | |
| Finland | 29 | (2.3) | | | |

| | | | | | | |
|---------------------------|-----------|--------------|---|---|----|---------|
| Malaysia | 28 | (2.1) | | | | |
| Slovenia | 28 | (2.6) | | | | |
| New Zealand | 27 | (2.3) | | | | |
| England | 26 | (2.3) | | | | |
| America | 26 | (1.5) | | | | |
| Armenia | 25 | (2.1) | | | | |
| International | 25 | (0.3) | | | | |
| Ukraine | 23 | (2.7) | | | | |
| Norway | 22 | (2.0) | | | | |
| Italy | 22 | (2.1) | | | | |
| Romania | 22 | (2.1) | | | | |
| Hungary | 21 | (1.7) | ▼ | | | |
| Sweden | 20 | (1.6) | ▼ | | | |
| Emirates | 20 | (1.3) | ▼ | | | |
| Turkey | 20 | (1.5) | ▼ | | | |
| Thailand | 16 | (1.5) | ▼ | | | |
| Chile | 16 | (1.5) | ▼ | Other participations | | |
| Macedonia | 16 | (2.0) | ▼ | Quebec / Canada | 49 | (3.2) ▲ |
| Georgia | 15 | (1.7) | ▼ | Connecticut / USA | 46 | (3.6) ▲ |
| Palestine | 14 | (1.7) | ▼ | Colorado / USA | 45 | (3.6) ▲ |
| Bahrain | 14 | (1.5) | ▼ | Florida / USA | 39 | (2.4) ▲ |
| Iran | 14 | (1.6) | ▼ | Dubai / UAE | 39 | (2.4) ▲ |
| Qatar | 13 | (1.5) | ▼ | California / USA | 36 | (3.2) ▲ |
| Tunisia | 12 | (1.5) | ▼ | Abu Dhabi / UAE | 34 | (2.1) ▲ |
| Saudi Arabia | 12 | (1.7) | ▼ | Alabama / USA | 33 | (3.3) ▲ |
| Indonesia | 11 | (1.5) | ▼ | Quebec / Canada | 32 | (3.9) |
| Oman | 11 | (0.9) | ▼ | Connecticut / USA | 32 | (3.6) ▲ |
| Lebanon | 11 | (1.8) | ▼ | Colorado / USA | 26 | (2.0) |
| Jordan | 9 | (0.9) | ▼ | Florida / USA | 22 | (2.7) |
| Syria | 9 | (1.5) | ▼ | Dubai / UAE | 19 | (1.9) ▼ |
| Morocco | 8 | (1.0) | ▼ | California / USA | 18 | (2.2) ▼ |
| Ghana | 4 | (1.0) | ▼ | | | |
| Participants in Grade (9) | | | | | | |
| Botswana | 7 | (1.1) | ▼ | Percentage is higher than the international average with statistical difference | | ▲ |
| Honduras | 7 | (1.2) | ▼ | Percentage is lower than the international average with statistical difference | | ▼ |
| South Africa | 4 | (0.5) | ▼ | Percentage is similar to the international average | | |

High achievement level in Mathematics:

This level represents students who got (550) scores or more in the test. Eighth grades students who reached this level apply their understanding and knowledge in almost wide range of complex situations, as they can carry out the ordering process and links. They can make calculations related to regular and decimal fractions to resolve written math problems. They

can also use their knowledge on geometry properties to solve math problems, as well as to identify and evaluate algebraic expressions, and solve algebraic equations of a single variable. Students who reach at this level are able to:

- Apply their knowledge on math in many complex situations.
- Perform calculations on regular and decimal fractions, and negative integers.
- Solve simple algebraic problems, including calculating algebraic amount, and solve Linear equations in two variables.
- Calculate areas and sizes of simple geometric shapes.
- Solve on probability and interpretation of tabular and graphically represented data.

The following example shows a sample of the questions that most students who reached this level answered it correctly.

**An example of a question answered by most
students reaching the high achievement level in Math**

| Country | Percentage of Correct Answers | | | Content Domain: Numbers | | |
|-------------|-------------------------------|-------|---|---|-------------------------|-----------------------|
| | | | | Knowledge Domain: knowing | | |
| | | | | Description: Express a part as a percentage out of the whole, and calculating the part by knowing its percentage and by knowing the whole | | |
| Singapore | 89 | (1.2) | ▲ | Bader, Salem and Amin performed 20 tries to throw balls in a basket | | |
| Korea | 76 | (1.9) | ▲ | | | |
| Hong Kong | 76 | (2.4) | ▲ | | | |
| Taiwan | 69 | (1.7) | ▲ | Fill in the boxes below: | | |
| Japan | 57 | (2.2) | ▲ | Name | No. of successful shots | % of successful shots |
| Israel | 57 | (2.1) | ▲ | Bader | 10 out of 20 | 50% |
| Russia | 55 | (2.1) | ▲ | | | |
| America | 54 | (1.5) | ▲ | | | 75% |
| Australia | 53 | (2.6) | ▲ | Salem | 15 out of 20 | |
| Lithuania | 53 | (1.9) | ▲ | | | |
| Sweden | 51 | (1.8) | ▲ | | 16 | |
| Finland | 50 | (2.4) | ▲ | Amin | out of 20 | 80% |
| Slovenia | 49 | (2.2) | ▲ | | | |
| England | 48 | (3.0) | ▲ | | | |
| New Zealand | 46 | (2.8) | ▲ | | | |
| Hungary | 46 | (2.5) | ▲ | | | |
| Italy | 46 | (2.3) | ▲ | | | |

| | | | | | | |
|---------------------------|----|-------|---|--|----|---------|
| Norway | 42 | (2.4) | | | | |
| Malaysia | 42 | (2.3) | | | | |
| International average | 37 | (0.3) | | | | |
| Emirates | 37 | (1.4) | | | | |
| Kazakhstan | 36 | (2.5) | | | | |
| Lebanon | 35 | (2.5) | | | | |
| Armenia | 34 | (2.2) | | | | |
| Turkey | 33 | (1.6) | ▼ | | | |
| Ukraine | 33 | (2.7) | | | | |
| Romania | 26 | (1.8) | ▼ | | | |
| Chile | 26 | (1.5) | ▼ | Other participations | | |
| Qatar | 24 | (1.4) | ▼ | Quebec / Canada | 81 | (1.8) ▲ |
| Macedonia | 22 | (2.0) | ▼ | Massachusetts / USA | 79 | (2.5) ▲ |
| Bahrain | 22 | (1.7) | ▼ | Minnesota / USA | 77 | (2.7) ▲ |
| Iran | 22 | (2.0) | ▼ | Alberta / Canada | 75 | (2.3) ▲ |
| Indonesia | 20 | (1.9) | ▼ | Ontario / Canada | 68 | (2.1) ▲ |
| Georgia | 20 | (2.0) | ▼ | Carolina / USA | 62 | (3.2) ▲ |
| Tunisia | 19 | (1.7) | ▼ | Connecticut / USA | 59 | (2.8) ▲ |
| Thailand | 18 | (2.1) | ▼ | Indiana / USA | 59 | (3.6) ▲ |
| Palestine | 18 | (1.8) | ▼ | Florida / USA | 58 | (4.0) ▲ |
| Syria | 17 | (1.9) | ▼ | Colorado / Latino | 51 | (3.5) ▲ |
| Saudi Arabia | 12 | (1.6) | ▼ | Dubai / UAE | 46 | (1.8) ▲ |
| Morocco | 11 | (0.8) | ▼ | California / USA | 41 | (3.1) |
| Jordan | 11 | (1.2) | ▼ | Abu Dhabi / UAE | 34 | (2.6) |
| Oman | 10 | (1.0) | ▼ | ALABAMA / Latino | 31 | (4.4) |
| Ghana | 8 | (1.2) | ▼ | | | |
| Participants in Grade (9) | | | | | | |
| Botswana | 47 | (2.0) | ▲ | Percentage is higher than the international average with statistical | | |
| South Africa | 18 | (1.0) | ▼ | Percentage is lower than the international average with statistical | | |
| Honduras | 11 | (1.3) | ▼ | Percentage is similar to the international average | | |

Moderate achievement level:

This level represents students who have received (475) scores or more in the test. Grade eight students who reached this level can apply their basic math cognitive in direct situations. They can also make additions and subtractions to solve written math problems of a single step, whether the numbers in that problem are Integers or fractional.

They can also find the value of unknown variable in a proportion, use the main properties of geometric shapes, read and interpret graphs, tables, realize the main concepts of probability principles, and understand simple algebraic relations. Students who reach this level can:

- Apply basic mathematical knowledge in simple and straightforward situations.

- Perform addition, subtraction, and multiplication to solve verbal math problems of one step.
- Solve linear equations of one variable only,
- Identify basic concepts of probability.
- Read and interpret figures tables, maps and measurements.

The following example shows a sample of the questions that most students who reached this level answered it correctly.

An example of a question answered by most students in grade eight reaching the average achievement level in Math

| Country | Percentage of Correct Answers | | | Content Domain: Algebra |
|-----------------------|-------------------------------|-------|---|---|
| | | | | Knowledge Domain: Knowing |
| | | | | Description: To know the meaning of simple algebraic expression that includes addition and subtraction |
| Hong Kong | 94 | (1.3) | ▲ | <p>What does $X \cdot Y + 1$ mean?</p> <p>A Add 1 to Y and then multiply by X</p> <p>B Multiply X and Y by 1</p> <p>C Add X and Y then add 1</p> <p>D Multiply X by Y then add 1</p> |
| Korea | 91 | (1.3) | ▲ | |
| Singapore | 91 | (1.1) | ▲ | |
| Taiwan | 90 | (1.3) | ▲ | |
| Russia | 89 | (1.2) | ▲ | |
| Japan | 87 | (1.5) | ▲ | |
| Ukraine | 81 | (2.1) | ▲ | |
| America | 80 | (1.2) | ▲ | |
| Armenia | 79 | (1.9) | ▲ | |
| Slovenia | 76 | (2.0) | ▲ | |
| Lithuania | 75 | (2.3) | ▲ | |
| Israel | 74 | (2.0) | ▲ | |
| Kazakhstan | 73 | (1.9) | ▲ | |
| Hungary | 73 | (1.9) | ▲ | |
| Finland | 72 | (2.2) | ▲ | |
| England | 72 | (2.8) | ▲ | |
| Georgia | 71 | (1.8) | ▲ | |
| Australia | 71 | (2.3) | ▲ | |
| Jordan | 69 | (2.0) | | |
| Emirates | 66 | (1.4) | | |
| international average | 65 | (0.3) | | |
| Italy | 65 | (2.0) | | |
| Romania | 65 | (2.3) | | |

| | | | | | | | |
|----------------------------------|----|-------|---|--|----|-------|---|
| Macedonia | 63 | (2.5) | | | | | |
| Bahrain | 62 | (1.7) | | | | | |
| New Zealand | 60 | (2.3) | | | | | |
| Thailand | 60 | (2.5) | ▼ | | | | |
| Lebanon | 59 | (2.6) | ▼ | Other participations | | | |
| Turkey | 58 | (1.9) | ▼ | Massachusetts / USA | 91 | (1.9) | ▲ |
| Chile | 58 | (2.4) | ▼ | Minnesota / USA | 88 | (2.1) | ▲ |
| Saudi Arabia | 57 | (2.2) | ▼ | Florida / USA | 88 | (2.6) | ▲ |
| Palestine | 56 | (2.0) | ▼ | Indiana / Latino | 86 | (1.6) | ▲ |
| Qatar | 55 | (2.3) | ▼ | Carolina / USA | 84 | (2.1) | ▲ |
| Iran | 55 | (2.0) | ▼ | Connecticut / USA | 83 | (2.3) | ▲ |
| Sweden | 53 | (2.0) | ▼ | Ontario / Canada | 81 | (2.0) | ▲ |
| Tunisia | 49 | (1.8) | ▼ | California / USA | 79 | (2.8) | ▲ |
| Indonesia | 48 | (2.3) | ▼ | Alberta / Canada | 78 | (2.1) | ▲ |
| Syria | 48 | (2.2) | ▼ | ALABAMA / Latino | 77 | (2.9) | ▲ |
| Oman | 47 | (1.7) | ▼ | Colorado / Latino | 76 | (3.3) | ▲ |
| Malaysia | 43 | (2.0) | ▼ | Dubai / UAE | 72 | (1.6) | ▲ |
| Morocco | 41 | (1.6) | ▼ | Quebec / Canada | 68 | (2.0) | |
| Ghana | 36 | (1.8) | ▼ | Abu Dhabi / UAE | 63 | (2.5) | |
| Norway | 36 | (2.6) | ▼ | | | | |
| Participants in Grade (9) | | | | | | | |
| Botswana | 52 | (1.7) | ▼ | Percentage is higher than the international average with statistical | | | |
| South Africa | 30 | (1.5) | ▼ | Percentage is lower than the international average with statistical | | | |
| Honduras | 26 | (2.0) | ▼ | Percentage is similar to the international average | | | |

Low achievement level in the Mathematics test:

This level includes students who got (400) scores or more in the test. Grade eight students who reached this level can do calculations of the integers, that is, they can make addition and subtraction and rounding in the case of integers. They can also make additions of decimal fractions of the same of decimals. They can also round integers to the nearest hundred, and they know some of the basic concepts and terminology. Students are at this level can:

- Perform calculations on positive integers.
- Round numbers that include two decimals to the nearest integer.
- Multiply numbers including two decimals by another number including three decimals using a calculator.
- Read and know information represented on a straight line.

The following example shows a sample of the questions that most students who reached this level answered it correctly.

**An example of a question answered by most
students in grade eight reaching the low achievement level in Math**

| Country | Percentage of Correct Answers | | | Content Domain: Numbers | | | |
|-----------------------|-------------------------------|-------|---|--|----|-------|---|
| | | | | Knowledge Domain: Knowing | | | |
| | | | | Description: To add two decimal numbers, one includes two decimals and the other includes three decimals | | | |
| Singapore | 94 | (0.8) | ▲ | <div> $42.65 + 5.748 =$ Answer: 48.398 </div> | | | |
| Malaysia | 91 | (1.2) | ▲ | | | | |
| Hong Kong | 91 | (1.5) | ▲ | | | | |
| Kazakhstan | 90 | (1.8) | ▲ | | | | |
| Lithuania | 90 | (1.5) | ▲ | | | | |
| Russia | 90 | (1.2) | ▲ | | | | |
| Taiwan | 89 | (1.1) | ▲ | | | | |
| America | 89 | (1.0) | ▲ | | | | |
| Hungary | 88 | (1.3) | ▲ | | | | |
| Italy | 88 | (1.6) | ▲ | | | | |
| Korea | 87 | (1.5) | ▲ | | | | |
| Slovenia | 85 | (1.7) | ▲ | | | | |
| Armenia | 84 | (1.9) | ▲ | | | | |
| Tunisia | 82 | (1.8) | ▲ | | | | |
| Israel | 82 | (1.4) | ▲ | | | | |
| Australia | 82 | (2.0) | ▲ | | | | |
| Norway | 81 | (1.9) | ▲ | | | | |
| Lebanon | 81 | (1.7) | ▲ | | | | |
| Japan | 81 | (1.6) | ▲ | | | | |
| Ukraine | 80 | (2.4) | ▲ | | | | |
| Emirates | 79 | (1.2) | ▲ | | | | |
| Sweden | 79 | (1.7) | ▲ | | | | |
| England | 79 | (2.4) | ▲ | | | | |
| Finland | 79 | (1.8) | ▲ | | | | |
| International average | 72 | (0.3) | | | | | |
| Morocco | 72 | (1.7) | | | | | |
| Qatar | 72 | (1.5) | | | | | |
| New Zealand | 70 | (2.9) | | Other participations | | | |
| Romania | 69 | (2.5) | ▼ | Massachusetts / USA | 95 | (1.3) | ▲ |
| Saudi Arabia | 65 | (2.5) | ▼ | Minnesota / USA | 93 | (1.6) | ▲ |
| Macedonia | 65 | (2.6) | ▼ | Florida / USA | 93 | (1.8) | ▲ |
| Georgia | 64 | (2.9) | ▼ | Alabama / America | 92 | (2.5) | ▲ |

| | | | | | | | |
|----------------------------------|----|-------|---|---|----|-------|---|
| Thailand | 64 | (2.4) | ▼ | Connecticut / USA | 91 | (1.7) | ▲ |
| Chile | 58 | (2.2) | ▼ | Indiana / USA | 90 | (1.8) | ▲ |
| Indonesia | 57 | (2.2) | ▼ | Carolina / Latino | 90 | (2.5) | ▲ |
| Palestine | 56 | (1.9) | ▼ | Quebec / Canada | 90 | (1.4) | ▲ |
| Oman | 49 | (1.6) | ▼ | California / USA | 89 | (1.4) | ▲ |
| Turkey | 48 | (1.8) | ▼ | Alberta / Canada | 86 | (1.3) | ▲ |
| Bahrain | 43 | (2.3) | ▼ | Ontario / Canada | 85 | (1.7) | ▲ |
| Iran | 42 | (2.2) | ▼ | Colorado / America | 82 | (2.2) | ▲ |
| Jordan | 36 | (1.7) | ▼ | Abu Dhabi / UAE | 81 | (2.1) | ▲ |
| Ghana | 36 | (2.1) | ▼ | Dubai / UAE | 80 | (2.1) | ▲ |
| Syria | 31 | (2.4) | ▼ | | | | |
| Participants in Grade (9) | | | | | | | |
| Botswana | 74 | (1.4) | | Percentage is higher than the international average with statistical significant difference | | | |
| Honduras | 66 | (2.3) | ▼ | Percentage is lower than the international average with statistical significant difference | | | |
| South Africa | 63 | (2.0) | ▼ | Percentage is similar to the international average | | | |

The number between brackets is the standard error for the percentage

Table (42) shows the percentages of students who arrived the achievement levels for all countries, and table (43) shows the percentages of Arab students who reached the achievement levels. These tables clearly show that the percentage of Jordanian students who reached the advanced level is (0%), and it is less than the international percentage of this level, which is (3%), and it is less than the Arab which is (1%). Regarding the high achievement level, Jordan's percentage is (6%), which is less than the international percentage which is (17%), and is also less than the Arab percentage which is (7%). For the moderate achievement level, Jordan's percentage is (26%), which is less than the international percentage (46%), and is equal to the Arab percentage in this level. Regarding the low achievement level, Jordan's percentage is (55%), and it is less than the international percentage in this level, which is (75%), but it is higher than the Arab percentage in this level, which is (54%).

In sum, the distribution of Jordanians students in the four achievement levels is close to the Arab distribution, but it is below the international percentages in all levels. There is an urgent need to revise the math curricula, the teachers' professional development programs and the school environment to make the necessary improvements that enhance Jordanian students' performance up to the international level.

Table (42)

Percentages of Students by Performance Levels in Math for the Participating Countries

| Country | | Advance (625) | High (550) | Moderate(475) | Low (400) | Country | | Advance (625) | High (550) | Moderate(475) | Low (400) |
|---------|-------------|------------------|---------------|---------------|--------------|---------|----------------------|------------------|---------------|---------------|--------------|
| 1 | Taiwan | 49 | 73 | 88 | 96 | 22 | Macedonia | 3 | 12 | 35 | 61 |
| 2 | Singapore | 48 | 78 | 92 | 99 | 23 | Georgia | 3 | 13 | 36 | 62 |
| 3 | Korea | 47 | 77 | 93 | 99 | 24 | Emirates | 2 | 14 | 42 | 73 |
| 4 | Hong Kong | 34 | 71 | 89 | 97 | 25 | Qatar | 2 | 10 | 29 | 54 |
| 5 | Japan | 27 | 61 | 87 | 97 | 26 | Iran | 2 | 8 | 26 | 55 |
| 6 | Russia | 14 | 47 | 78 | 95 | 27 | Malaysia | 2 | 12 | 36 | 65 |
| 7 | Israel | 12 | 40 | 68 | 87 | 28 | Thailand | 2 | 8 | 28 | 62 |
| 8 | Australia | 9 | 29 | 63 | 89 | 29 | Bahrain | 1 | 8 | 26 | 53 |
| 9 | England | 8 | 32 | 65 | 88 | 30 | Sweden | 1 | 16 | 57 | 89 |
| 10 | Hungary | 8 | 32 | 65 | 88 | 31 | Palestine | 1 | 7 | 25 | 52 |
| 11 | Turkey | 7 | 20 | 40 | 67 | 32 | Lebanon | 1 | 9 | 38 | 73 |
| 12 | America | 7 | 30 | 68 | 92 | 33 | Norway | 1 | 12 | 51 | 87 |
| 13 | Romania | 5 | 19 | 44 | 71 | 34 | Saudi Arabia | 1 | 5 | 20 | 47 |
| 14 | Lithuania | 5 | 29 | 64 | 90 | 35 | Chile | 1 | 5 | 23 | 57 |
| 15 | New Zealand | 5 | 24 | 57 | 84 | 36 | Jordan | 0 | 6 | 26 | 55 |
| 16 | Ukraine | 5 | 22 | 53 | 81 | 37 | Oman | 0 | 4 | 16 | 39 |
| 17 | Slovenia | 4 | 27 | 67 | 93 | 38 | Tunisia | 0 | 5 | 25 | 61 |
| 18 | Finland | 4 | 30 | 73 | 96 | 39 | Syria | 0 | 3 | 17 | 43 |
| 19 | Italy | 3 | 24 | 64 | 90 | 40 | Indonesia | 0 | 2 | 15 | 43 |
| 20 | Armenia | 3 | 18 | 49 | 76 | 41 | Morocco | 0 | 2 | 12 | 36 |
| 21 | Kazakhstan | 3 | 23 | 57 | 85 | 42 | Ghana | 0 | 1 | 5 | 21 |
| | | | | | | | International median | 3 | 17 | 46 | 75 |

| Participants in Grade (9) | | | | | | | | | | | |
|---------------------------|-------------------|----|----|----|----|----|-------------------|---|----|----|----|
| 1 | South Africa | 1 | 3 | 9 | 24 | 3 | Honduras | 0 | 1 | 4 | 21 |
| 2 | Botswana | 0 | 2 | 15 | 50 | | | | | | |
| Other Participations | | | | | | | | | | | |
| 1 | Massachusetts / | 19 | 57 | 88 | 98 | 8 | Quebec / Canada | 6 | 40 | 82 | 98 |
| 2 | Carolina / Latino | 14 | 44 | 78 | 95 | 9 | Dubai / UAE | 5 | 23 | 53 | 79 |
| 3 | Minnesota / USA | 13 | 49 | 83 | 97 | 10 | California / USA | 5 | 24 | 59 | 87 |
| 4 | Connecticut / USA | 10 | 37 | 69 | 91 | 11 | Ontario / Canada | 4 | 31 | 71 | 94 |
| 5 | Florida / USA | 8 | 31 | 68 | 94 | 12 | Alberta / Canada | 3 | 24 | 69 | 95 |
| 6 | Colorado / USA | 8 | 35 | 71 | 93 | 13 | Alabama / America | 2 | 15 | 46 | 79 |
| 7 | Indiana / USA | 7 | 35 | 74 | 95 | 14 | Abu Dhabi / UAE | 2 | 12 | 39 | 71 |

Table (43)

Percentages of Students by Performance Levels in Math for the Participating Arab Countries

| | Country | Advance (625) | High (550) | Moderate(475) | Low (400) |
|---|----------------------|---------------|------------|---------------|-----------|
| 1 | United Arab Emirates | 2 | 14 | 42 | 73 |
| 2 | Qatar | 2 | 10 | 29 | 54 |
| 3 | Bahrain | 1 | 8 | 26 | 53 |
| 4 | Palestine | 1 | 7 | 25 | 52 |
| 5 | Lebanon | 1 | 9 | 38 | 73 |
| 6 | Saudi Arabia | 1 | 5 | 20 | 47 |
| 7 | Jordan | 0 | 6 | 26 | 55 |
| 8 | Oman | 0 | 4 | 16 | 39 |

| | | | | | |
|-----------|-----------------------------|----------|-----------|-----------|-----------|
| 9 | Tunisia | 0 | 5 | 25 | 61 |
| 10 | Syria | 0 | 3 | 17 | 43 |
| 11 | Morocco | 0 | 2 | 12 | 36 |
| 12 | Dubai / UAE | 5 | 23 | 53 | 79 |
| 13 | Abu Dhabi / UAE | 2 | 12 | 39 | 71 |
| | Arab median | 1 | 7 | 26 | 54 |
| | International median | 3 | 17 | 46 | 75 |

Level of Performance in the Mathematics Test by Gender

Table (44) shows the performance averages in math test by gender for all countries, and Table (45) shows the performance averages of the participating Arab countries by gender.

Table (44)

Performance Averages in Science for the Participating Countries in (TIMSS 2011) by Gender

| Rank | Country | Performance Average | | Absolute difference | Rank | Country | Performance Average | | Absolute difference |
|-----------|---------------|---------------------|-------|---------------------|------|--------------|---------------------|-------|---------------------|
| | | Females | Males | | | | Females | Males | |
| 1 | Morocco | 371 | 371 | 0(3.2) | 24 | Armenia | 472 | 462 | 10(3.1) |
| 2 | Russia | 539 | 539 | 1(2.9) | 25 | Syria | 375 | 385 | 11(5.7) |
| 3 | Kazakhstan | 486 | 488 | 2(3.3) | 26 | Italy | 493 | 504 | 11(2.9) |
| 4 | Norway | 476 | 473 | 3(3.1) | 27 | Romania | 464 | 453 | 11(3.6) |
| 5 | England | 508 | 505 | 3(5.6) | 28 | Qatar | 415 | 404 | 11(9.5) |
| 6 | Georgia | 430 | 432 | 3(4.0) | 29 | Lebanon | 444 | 456 | 12(4.7) |
| 7 | Ukraine | 478 | 481 | 3(4.4) | 30 | Indonesia | 392 | 379 | 13(4.0) |
| 8 | United States | 508 | 511 | 4(2.2) | 31 | Chile | 409 | 424 | 14(3.6) |
| 9 | Sweden | 486 | 482 | 4(2.4) | 32 | Saudi Arabia | 401 | 387 | 15(8.9) |
| 10 | Finland | 516 | 512 | 4(2.3) | 33 | Tunisia | 417 | 433 | 17(2.5) |
| 11 | Slovenia | 502 | 507 | 5(2.8) | 34 | Emirates | 464 | 447 | 17(4.2) |

| | | | | | | | | | |
|-----------------------------|-------------------|-----|-----|---------------|-----------|------------------------|------------|------------|----------------|
| 12 | Hungary | 502 | 508 | 6(3.5) | 35 | Thailand | 435 | 417 | 18(4.4) |
| 13 | Hong Kong | 588 | 583 | 6(5.5) | 36 | New Zealand | 478 | 496 | 18(4.7) |
| 14 | Taiwan | 613 | 606 | 6(4.1) | 37 | Malaysia | 449 | 430 | 19(4.4) |
| 15 | Korea | 610 | 616 | 6(3.1) | 38 | Palestine | 415 | 392 | 23(7.0) |
| 16 | Iran | 411 | 418 | 7(8.1) | 39 | Ghana | 318 | 342 | 23(2.9) |
| 17 | Macedonia | 430 | 423 | 7(4.7) | 40 | Jordan | 420 | 392 | 28(7.4) |
| 18 | Japan | 566 | 574 | 8(4.1) | 41 | Bahrain | 430 | 388 | 43(4.0) |
| 19 | Israel | 520 | 512 | 8(4.4) | 42 | Oman | 397 | 334 | 63(4.6) |
| 20 | Singapore | 615 | 607 | 9(3.5) | 43 | The International | 469 | 465 | 4(0.9) |
| 21 | Turkey | 457 | 448 | 9(3.5) | 44 | South Africa | 354 | 350 | 3(4.0) |
| 22 | Australia | 500 | 509 | 9(6.9) | 45 | Botswana | 403 | 390 | 14(3.1) |
| 23 | Lithuania | 507 | 498 | 9(3.0) | 46 | Honduras | 328 | 351 | 23(3.5) |
| Other participations | | | | | | | | | |
| 1 | Ontario / Canada | 512 | 512 | 0(3.1) | 8 | California / USA | 491 | 494 | 3(4.1) |
| 2 | Quebec / Canada | 531 | 532 | 0(2.7) | 9 | Colorado / America | 516 | 520 | 4(3.4) |
| 3 | Minnesota / USA | 545 | 545 | 0(3.9) | 10 | Connecticut / / Latino | 520 | 516 | 4(4.5) |
| 4 | Alabama / America | 467 | 465 | 2(3.9) | 11 | Massachusetts / USA | 558 | 563 | 5(4.5) |
| 5 | Abu Dhabi / UAE | 450 | 448 | 2(6.4) | 12 | Florida / USA | 509 | 517 | 8(5.5) |
| 6 | Alberta / Canada | 504 | 506 | 2(3.0) | 13 | Indiana / / Latino | 518 | 526 | 8(4.0) |
| 7 | Carolina / USA | 535 | 539 | 3(5.1) | 14 | Dubai / UAE | 486 | 470 | 16(8.9) |

The difference written in bold font is statistically significant at $\alpha = 0.05$

The difference written in regular font is not statistically significant at $\alpha = 0.05$

Table (45)

**Performance Averages in Math for the
Participating Arab Countries in (TIMSS 2011) by Gender**

| Rank | Country | Performance | | Absolute differenc | Rank | Country | Performance | | Absolute differenc |
|----------|-----------|-------------|------|-----------------------|------|-----------------------|-------------|------------|-----------------------|
| | | Female | Male | | | | Fem | Male | |
| 1 | Morocco | 371 | 371 | 0(3.2) | 9 | Jordan | 420 | 392 | 28(7.4) |
| 2 | Syria | 375 | 385 | 11(5.7) | 10 | Bahrain | 430 | 388 | 43(4.0) |
| 3 | Qatar | 415 | 404 | 11(9.5) | 11 | Oman | 397 | 334 | 63(4.6) |
| 4 | Lebanon | 444 | 456 | 12(4.7) | | Abu Dhabi / UAE | 450 | 448 | 2(6.4) |
| 5 | Saudi | 401 | 387 | 15(8.9) | | Dubai / UAE | 486 | 470 | 16(8.9) |
| 6 | Tunisia | 417 | 433 | 17(2.5) | | | | | |
| 7 | Emirates | 464 | 447 | 17(4.2) | | Arab average | 414 | 399 | 15(2.6) |
| 8 | Palestine | 415 | 392 | 23(7.0) | | International Average | 469 | 465 | 4(0.9) |

The difference written in bold font is statistically significant at $\alpha = 0.05$

The difference written in regular font is not statistically significant at $\alpha = 0.05$

At the international level, the males' average is (465), while the females' average is (469), so the difference between both averages is (4) scores, and this difference is statistically significant at ($\alpha = 0.05$). At the Arab level, the males' average is (399), and the females' average is (414). The difference between both averages is (15) scores and in favor of females, and is statistically significant at ($\alpha = 0.05$). At Jordan's level, the females' average is (420) and the males' average is (392); and so, the difference between both averages is (28) in favor of females and this difference is statistically significant. The outperform of females over males in the Jordanian educational system has become a serious issue that needs to be discussed to identify its reasons, whether they are attributed to social factors, or that the females schools are better than males school. There is an urgent need to review these factors to improve the males' performance levels to reach the females performance levels.

Level of Performance in the Math Test by Content Domains

Table (46) shows the averages performance of the Arab countries by the content domains of the math test.

Table (46)

Arab Countries Averages in Math by Content

| Country | Numbers | | Algebra | | Geometry | | Data and Probability | |
|-----------------------|---------|-------|---------|-------|----------|-------|----------------------|-------|
| Emirates | 459 | (2.2) | 468 | (2.2) | 431 | (2.4) | 440 | (2.4) |
| Lebanon | 451 | (3.8) | 471 | (3.8) | 447 | (3.8) | 393 | (5.2) |
| Tunisia | 431 | (2.8) | 419 | (2.9) | 426 | (3.2) | 398 | (3.3) |
| Qatar | 408 | (3.4) | 425 | (2.8) | 387 | (3.6) | 390 | (3.6) |
| Bahrain | 397 | (1.7) | 424 | (1.7) | 398 | (2.6) | 407 | (2.6) |
| Jordan | 390 | (3.8) | 432 | (3.9) | 407 | (3.7) | 379 | (3.7) |
| Palestine | 400 | (3.4) | 419 | (3.3) | 416 | (3.6) | 368 | (3.6) |
| Saudi Arabia | 393 | (4.8) | 399 | (4.9) | 364 | (5.3) | 387 | (5.1) |
| Syria | 373 | (4.0) | 391 | (4.9) | 386 | (5.0) | 343 | (4.7) |
| Morocco | 379 | (2.6) | 357 | (2.7) | 390 | (2.5) | 332 | (2.0) |
| Oman | 351 | (3.0) | 383 | (2.8) | 377 | (2.7) | 342 | (3.1) |
| International average | 459 | (0.6) | 463 | (0.6) | 454 | (0.6) | 450 | (0.6) |
| Arab average | 403 | (1.1) | 417 | (1.1) | 403 | (1.1) | 380 | (1.1) |

The performance average of Jordan in the content domains are as follows: Numbers (390), Algebra (432), Geometry (407), Data and Probability (379). These averages are somehow close to the similar Arab averages. The averages of Arab performance are as follows: Numbers (403), Algebra (417), Geometry (403), Data and Probability (380). These averages are all below the international average, which are as follows: Numbers (459), Algebra (463), Geometry (454), Data and Probability (450). When comparing the performance average of Jordan with the international averages by content, it is noted that the Jordanian average is lower than the international average in the four content domains with statistical difference. Therefore, upgrading the students' performance to reach the international levels requires making the necessary improvements to the curricula, teaching methods, and the school environment.

Levels of Performance in Math Test by Cognitive Domains

Table (47) shows the Arab Countries Averages in Math by Cognitive Domains.

Table (47): Arab Countries Averages in Math by Cognitive Domains

| Country | Knowing | | Applying | | Reasoning | |
|---------------------------|------------|--------------|------------|--------------|------------|--------------|
| Emirates | 467 | (2.2) | 442 | (2.2) | 449 | (2.1) |
| Lebanon | 464 | (3.9) | 436 | (4.1) | 426 | (4.7) |
| Tunisia | 425 | (2.8) | 421 | (2.9) | 423 | (2.7) |
| Qatar | 418 | (2.9) | 396 | (3.3) | 406 | (3.3) |
| Bahrain | 411 | (2.4) | 400 | (2.4) | 415 | (2.1) |
| Jordan | 405 | (4.3) | 397 | (3.8) | 416 | (3.8) |
| Palestine | 406 | (3.5) | 397 | (3.5) | 404 | (4.1) |
| Saudi Arabia | 402 | (4.6) | 375 | (4.8) | 388 | (4.7) |
| Syria | 374 | (4.4) | 379 | (4.2) | 371 | (5.4) |
| Morocco | 363 | (2.2) | 378 | (1.9) | 357 | (2.7) |
| Oman | 365 | (3.0) | 360 | (3.0) | 369 | (2.8) |
| The international average | 460 | (0.6) | 458 | (0.5) | 458 | (0.6) |
| Arab average | 409 | (1.0) | 398 | (1.0) | 402 | (1.1) |

Jordan's performance averages in the cognitive domains are as follows: knowing (405), applying (397), and reasoning (416). These averages are similar to some extent to the average Arab countries in knowing and applying domains. The differences between Jordan and Arab averages are not statistically significant where the Arab average performance is as follows: knowing (409), applying (398). Regarding reasoning, the Jordanian average is higher than the Arab average, which was (402) with statistical significance. The Arab and Jordanian averages were below the international averages with statistical significance as the international averages are as follows: knowing (460), applying (458), and reasoning (458).

Relative Difficulty of Math domains by Content Domain and by Cognitive Domain.

Table (48) shows the percentages averages of correct answers in Mathematics by content and by cognitive domains of Math.

**Table (48): Average Percentages of Correct Answers in Math by
Content and Cognitive Domains for the Arab Countries**

| Country | | Math | Math Content Domains | | | | Math Cognitive Domains | | |
|---------|--------------------------|----------|----------------------|----------|----------|----------------------|------------------------|----------|-----------|
| | | | Numbers | Algebra | Geometry | Data &Probability | Knowing | Applying | Reasoning |
| | International Average | (0.1) 41 | (0.1) 43 | (0.1) 37 | (0.1) 39 | (0.1) 45 | (0.1) 49 | (0.1) 39 | (0.1) 30 |
| 1 | Emirates | (0.5) 37 | (0.5) 40 | (0.5) 34 | (0.5) 32 | (0.4) 41 | (0.5) 48 | (0.5) 33 | (0.4) 25 |
| 2 | Lebanon | (0.8) 34 | (0.9) 37 | (0.9) 35 | (0.9) 33 | (0.8) 31 | (1.0) 47 | (0.8) 31 | (0.8) 21 |
| 3 | Qatar | (0.5) 30 | (0.6) 32 | (0.6) 29 | (0.5) 27 | (0.6) 34 | (0.6) 39 | (0.5) 28 | (0.5) 21 |
| 4 | Palestine | (0.6) 29 | (0.7) 29 | (0.6) 27 | (0.7) 30 | (0.5) 30 | (0.7) 37 | (0.5) 27 | (0.6) 20 |
| 4 | Tunisia | (0.6) 29 | (0.7) 32 | (0.5) 25 | (0.6) 29 | (0.7) 32 | (0.7) 37 | (0.6) 28 | (0.5) 20 |
| 4 | Jordan | (0.5) 29 | (0.6) 27 | (0.6) 29 | (0.6) 28 | (0.6) 31 | (0.7) 37 | (0.5) 26 | (0.5) 21 |
| 4 | Bahrain | (0.3) 29 | (0.3) 29 | (0.4) 27 | (0.4) 27 | (0.4) 36 | (0.4) 37 | (0.3) 27 | (0.4) 21 |
| | Arab average | (0.2) 29 | (0.3) 29 | (0.2) 27 | (0.3) 28 | (0.2) 31 | (0.3) 37 | (0.2) 27 | (0.2) 20 |
| 8 | Saudi Arabia | (0.7) 26 | (0.9) 28 | (0.7) 24 | (0.7) 24 | (0.8) 31 | (0.9) 35 | (0.7) 24 | (0.6) 18 |
| 9 | Syria | (0.6) 25 | (0.6) 24 | (0.7) 24 | (0.8) 25 | (0.6) 26 | (0.7) 31 | (0.6) 24 | (0.6) 17 |
| 10 | Oman | (0.3) 24 | (0.4) 23 | (0.4) 23 | (0.3) 25 | (0.4) 27 | (0.4) 31 | (0.3) 22 | (0.3) 17 |
| 11 | Morocco | (0.2) 22 | (0.3) 23 | (0.3) 19 | (0.4) 24 | (0.3) 24 | (0.3) 28 | (0.3) 22 | (0.2) 14 |
| | Dubai / UAE | (0.5) 42 | (0.6) 45 | (0.6) 39 | (0.6) 36 | (0.5) 46 | (0.5) 54 | (0.6) 39 | (0.6) 29 |
| | Abu Dhabi / UAE | (0.8) 35 | (0.9) 39 | (0.9) 32 | (0.8) 31 | (0.8) 39 | (0.9) 47 | (0.9) 32 | (0.8) 24 |

Jordan's averages by content are as follows: Numbers (27%), Algebra (29%), Geometry (28%), and Data and probability (31%). These percentages reflect the varying degree of difficulty by content. The content of Math can be ordered by the degree of difficulty to our students starting from the most difficult to the easiest as follows: Numbers, Geometry, Algebra (29%) and Data

and probability. It should be noted that these percentages are below the similar percentages at the international level but are close to the similar Arab percentage averages.

Regarding the cognitive dimension, Jordan's percentages are (37%) in knowing domain, (26%) in applying domain, and (21%) in reasoning domain. These percentages show the order of these areas by difficulty (from the most difficult to the easiest) as follows: reasoning, applying, and knowing. However, this order is the same on the Arab and international levels. It should be noted that the Jordanian percentages are all below the similar international percentages but are close to the similar Arab percentages.

Jordan's Performance Levels by Mathematics Content and by Gender

Table (49) shows that females' performance averages in math is (28) scores higher than the males' performance averages and this difference is statistically significant.

Table (49)

Averages of Jordanian Students Performance in Math by Content and Gender

| Content | Males | Females | Absolute Difference |
|-----------------------------|-----------------|-----------------|----------------------------|
| Numbers | 383(6.7) | 398(4.4) | 14(8.5) |
| Algebra | 413(6.2) | 451(4.2) | 39(7.5)* |
| Geometry | 397(5.9) | 417(4.4) | 20(7.5)* |
| Data and Probability | 367(6.2) | 393(4.1) | 27(7.6)* |
| Math | 392(5.9) | 420(4.3) | 28(7.4)* |

* The difference is statistically significant at ($\alpha = 0.05$)

Also, table (49) shows that the differences between females' performance average and males' performance average by content (Algebra, Geometry, Data and Probability) are (39, 20, 27) scores respectively and in favor of females, where these differences are all statistically significant. while the difference between females' performance average and males' performance average numbers is (14) which is not statistically significant.

Jordan's Performance Levels by Cognitive domain and by Gender

Table (50) shows that the differences between the female' performance averages and males' performance averages in math cognitive domains (knowing, applying, and reasoning) are (33,

20, 23) scores respectively and in favor of females, and these differences are all statistically significant.

Table (50)

Averages of Jordanian Students Performance in Math by Cognitive Domains and Gender

| Domain | Males | Females | Absolute Difference |
|-----------|----------|----------|---------------------|
| Knowing | 389(7.0) | 422(4.8) | 33(8.6)* |
| Applying | 388(6.1) | 408(4.2) | 20(7.5)* |
| Reasoning | 404(5.9) | 427(4.9) | 23(7.9)* |
| Math | 392(5.9) | 420(4.3) | 28(7.4)* |

* The difference is statistically significant at ($\alpha = 0.05$)

Jordan's Performance Levels by Mathematics Content and by School's Location

Table (49) shows that the performance average of students in the urban areas is (35) scores higher than the performance average of students in the rural areas.

Table (51)

Averages of Jordanian Students Performance in Math by Content and School Location

| Content | Rural | Urban | Absolute Difference |
|----------------------|----------|----------|---------------------|
| Numbers | 366(9.5) | 398(3.7) | 32(10.0)* |
| Algebra | 404(8.9) | 439(4.1) | 35(9.9)* |
| Geometry | 382(8.9) | 414(3.8) | 32(9.7)* |
| Data and Probability | 354(8.8) | 387(3.9) | 33(9.5)* |
| Math | 378(8.1) | 414(3.9) | 35(9.0)* |

* The difference is statistically significant at ($\alpha = 0.05$)

Table (51) also shows that the differences between the performance averages of students in urban and the performance average of students in rural in algebra is (35) scores, in geometry is (32) scores, in numbers is (32) scores, and in data and probability is (33) scores. All these scores are in favor of students in the urban and the differences are statistically significant.

Jordan's Performance Levels by Cognitive domain and by School's Location

Table (52) indicates that the differences between the performance averages of the urban areas and the performance averages of students in the rural areas in the cognitive domains of math (

knowing, applying, reasoning) are (37, 32, 30) scores respectively, in favor of students in the urban areas and these differences are statistically significant.

Table (52)

Averages of Jordanian Students Performance in Math by Cognitive Domains

| Cognitive Domains | Rural areas | Urban areas | Absolute Difference |
|-------------------|-----------------|-----------------|---------------------|
| Knowing | 376(9.9) | 413(4.4) | 37(10.6)* |
| Applying | 372(8.4) | 404(3.9) | 32(9.1)* |
| and Reasoning | 392(8.1) | 422(3.9) | 30(8.7)* |
| Math | 378(8.1) | 414(3.9) | 35(9.0)* |

* The difference is statistically significant at ($\alpha = 0.05$)

Jordan's Performance Levels by Content and by Authority

Table (53) shows that the performance averages of private education students in math is (76) scores higher than the performance average of the Ministry of Education students, and is also (31) scores higher than the performance average of UNRWA students. The differences between the averages of UNRWA students and the Ministry of Education students is (45) scores and these differences are statistically at $\alpha = 0.05$.

Table (53)

**Averages of Jordanian Students
Performance in Math by Content and Supervising Authority**

| Content | Ministry of Education | Private Education | UNRWA |
|----------------------|-----------------------|-------------------|-----------------|
| Numbers | 377(4.5) | 455(9.5) | 422(7.3) |
| Algebra | 419(4.6) | 491(9.7) | 461(6.4) |
| Geometry | 394(4.4) | 465(11.0) | 436(6.7) |
| Data and Probability | 367(4.4) | 436(9.2) | 410(8.2) |
| Math | 392(4.4) | 468(9.8) | 437(5.7) |

The situation is the same in terms of order and significance of differences among the averages at the level of the math content domains.

Table (54)

Differences between Performance Averages by Math Content and Supervising Authority

| Science | Supervising Authority | Ministry of Education | Private Education | UNRWA |
|----------------------|-----------------------|-----------------------|-------------------|-------|
| Numbers | Ministry of Education | - | - | - |
| | Private Education | 78(10.7)* | - | - |
| | UNRWA | 46(8.2)* | 32(11.9)* | - |
| Algebra | Ministry of Education | - | - | - |
| | Private Education | 72(10.8)* | - | - |
| | UNRWA | 42(7.7)* | 30(11.6)* | - |
| Geometry | Ministry of Education | - | - | - |
| | Private Education | 70(11.9)* | - | - |
| | UNRWA | 41(7.7)* | 29(12.7)* | - |
| Data and Probability | Ministry of Education | - | - | - |
| | Private Education | 70(10.7)* | - | - |
| | UNRWA | 43(8.6)* | 26(12.2)* | - |
| Math | Ministry of Education | - | - | - |
| | Private Education | 76(10.9)* | - | - |
| | UNRWA | 45(6.9)* | 31(11.4)* | - |

* The difference is statistically significant at ($\alpha = 0.05$)

Jordan's Performance Levels by Cognitive Domain and by Supervising Authority

Table (55) shows that the differences between the performance averages of the Ministry of Education students and the private education students in the cognitive domains of math (knowing, applying, reasoning) are (82,75,65) respectively in favor of private education students and are all statistically significant. The differences between private education students and UNRWA students in the same cognitive domains are (37, 32, 24) and are all statistically significant for the favor of private education students. (See table (56)).

Table (55)

Averages of Jordanian Students Performance
in Math by Cognitive Domains and Supervising Authority

| Cognitive Domains | Ministry of Education | Private Education | UNRWA |
|-------------------|-----------------------|-------------------|----------|
| knowing | 391(5.1) | 472(9.5) | 435(6.9) |
| Applying | 384(4.4) | 459(8.9) | 427(6.4) |
| Reasoning | 404(4.4) | 469(9.8) | 444(6.1) |
| Math | 392(4.4) | 468(9.8) | 437(5.7) |

* The difference is statistically significant at ($\alpha = 0.05$)

Table (56)**Differences between Performance Averages by Cognitive Domains and Supervising Authority**

| Cognitive | Supervising | Ministry of Education | Private Education | UNRWA |
|------------------|-----------------------|------------------------------|--------------------------|--------------|
| Knowing | Ministry of Education | - | - | - |
| | Private Education | 82(10.9)* | - | |
| | UNRWA | 45(8.3)* | 37(11.6)* | - |
| Applying | Ministry of Education | - | - | - |
| | Private Education | 75(9.9)* | - | |
| | UNRWA | 43(7.4)* | 32(10.9)* | - |
| reasoning | Ministry of Education | - | - | - |
| | Private Education | 65(10.9)* | - | |
| | UNRWA | 41(6.6)* | 24(11.8)* | - |
| Science | Ministry of Education | - | - | - |
| | Private Education | 76(10.9)* | - | |
| | UNRWA | 45(6.9)* | 31(11.4)* | - |

* The difference is statistically significant at ($\alpha = 0.05$)

When comparing the differences between the performance averages of UNRWA students and private education students, it was noted that all these differences are statistically significant at ($\alpha = 0.05$) in favor of private education. In sum, the performance by content and by the supervising authority starting from the highest to the lowest was order as follows: Private Education, UNRWA, Ministry of Education.

Jordan's Performance Levels by Content and by Project

Table (57) shows that the order of projects by performance averages in math starting from the highest to the lowest are as follows: discovery schools (426), Education Reform Support Project (ERSP) (410), the Ministry of Education schools (389), and Madrasati (388). The difference between discovery schools and the (ERSP) on one hand and the Ministry of Education schools, and Madrasati on the other hand is statistically significant, while the difference between the discovery schools and the (ERSP) is not statistically significant, in addition to that the difference between Madrasati and MoE schools is not statistically significant .

Table (57)

Averages of Jordanian Students Performance in Math by Content and Project

| Content | Discovery schools | Madrasati | Ministry of Education | (ERSP) |
|-----------------------------|-------------------|-----------------|-----------------------|-----------------|
| Numbers | 406(8.3) | 376(7.2) | 374(5.2) | 389(3.6) |
| Algebra | 451(7.9) | 413(6.4) | 416(5.5) | 439(3.3) |
| Geometry | 422(8.0) | 394(6.9) | 392(5.2) | 408(3.8) |
| Data and Probability | 398(7.7) | 367(6.6) | 363(5.2) | 383(4.2) |
| Math | 426(8.1) | 388(8.4) | 389(5.3) | 410(2.7) |

Table (57) also includes the performance average by project and by math content. Table (58) reveals the significance of differences between these averages. The differences between the averages at the level of math sub contents remained the same as they are in math, except that the difference in the content of numbers between the discovery schools and the (ERSP) was statistically significant.

Table (58)

Differences between Performance Averages by Math Content and Project

| Math Content | Project | Discovery schools | Madrasati | Ministry of Education | (ERSP) |
|-----------------------------|-----------------------|-------------------|-----------|-----------------------|--------|
| Numbers | Discovery schools | - | - | - | - |
| | Madrasati | 30(10.8)* | - | - | - |
| | Ministry of Education | 33(9.9)* | 2(8.6) | - | - |
| | (ERSP) | 17(8.7)* | 13(7.6) | 16(6.3)* | - |
| Algebra | Discovery schools | - | - | - | - |
| | Madrasati | 38(10.2)* | - | - | - |
| | Ministry of Education | 35(9.9)* | 3(8.5) | - | - |
| | (ERSP) | 12(8.6) | 26(7.3)* | 23(6.4) | - |
| Geometry | Discovery schools | - | - | - | - |
| | Madrasati | 29(10.6)* | - | - | - |
| | Ministry of Education | 31(9.9)* | 2(8.6) | - | - |
| | (ERSP) | 14(8.5) | 15(7.9) | 17(6.7)* | - |
| Data and Probability | Discovery schools | - | - | - | - |
| | Madrasati | 31(10.0)* | - | - | - |
| | Ministry of Education | 35(9.5)* | 4(8.2) | - | - |
| | (ERSP) | 15(8.3) | 15(7.3)* | 19(6.8)* | - |
| Math | Discovery schools | - | - | - | - |
| | Madrasati | 37(11.6)* | - | - | - |
| | Ministry of Education | 37(9.9)* | 0.7(9.9) | - | - |
| | (ERSP) | 16(8.5) | 22(8.8)* | 21(6.1)* | - |

* The difference is statistically significant at ($\alpha = 0.05$)

Jordan's Performance Levels by Cognitive Domain and by Project

Table (59) indicates that performance averages by the cognitive domain were higher for the discovery schools, followed by the Education Reform Support Project (ERSP) followed by the performance averages of the Ministry of Education and Madrasati. Regarding the significance of differences between the performance averages by cognitive domain, table (60) shows that the statistically significant differences were between the discovery schools and (ERSP) on one hand and Madrasati and the Ministry of Education on the other hand, while all other differences are not statistically significant.

Table (59)
Averages of Jordanian Students Performance in Math by Cognitive Domains and Project

| Cognitive Domains | Discovery schools | Madrasati | Ministry of Education | (ERSP) |
|------------------------|-------------------|-----------|-----------------------|----------|
| Knowing | 427(8.9) | 386(8.9) | 387(6.0) | 410(3.0) |
| Applying | 414(7.9) | 381(7.8) | 381(5.2) | 399(3.1) |
| Thinking and Reasoning | 435(7.7) | 402(7.4) | 401(5.1) | 417(4.2) |
| Science | 426(8.1) | 388(8.4) | 389(5.3) | 410(2.7) |

Table (60)
Differences between Performance Averages by Cognitive Domains and Project

| Cognitive | Project | Exploratory schools | Madrasati | Ministry of Education | (ERSP) |
|-----------|-------------------|---------------------|-----------|-----------------------|--------|
| Knowing | Discovery | - | - | - | - |
| | Madrasati | 41(12.6)* | - | - | - |
| | Ministry of | 40(10.9)* | 2(10.7) | - | - |
| | (ERSP) | 17(9.4) | 24(9.5)* | 22(7.3)* | - |
| Applying | Discovery schools | - | - | - | - |
| | Madrasati | 33(11.2)* | - | - | - |
| | Ministry of | 33(9.8)* | 0.2(9.3) | - | - |
| | (ERSP) | 16(8.6) | 18(8.4)* | 18(6.6)* | - |
| Reasoning | Discovery schools | - | - | - | - |
| | Madrasati | 33(10.4)* | - | - | - |
| | Ministry of | 34(9.5)* | 1(8.5) | - | - |
| | (ERSP) | 18(8.4) | 15(7.9) | 16(6.1)* | - |
| Math | Discovery schools | - | - | - | - |
| | Madrasati | 37(11.6)* | - | - | - |
| | Ministry of | 37 (9.9)* | 0.7(9.9) | - | - |
| | (ERSP) | 16(8.5) | 22(8.8)* | 21(6.1)* | - |

* The difference is statistically significant at ($\alpha = 0.05$)

Levels of Performance in Science and Math by School and Directorate

(230) schools participated in this study, and the results were analyzed at the school's level. As the performance average for every school in Math and science, and the performance average in both subjects together were calculated. Also, the school's rank in science and Math, and the school's rank in both subjects together were calculated. Patriarch Diodoros the First School in Aqaba directorate, which is one of the private sector schools, ranked first among all schools, and in both subjects. The students' performance in this school in Math is 533, and 596 in Science, and in both subjects together is 575.

Kreimeh Secondary School for Boys in the North Aghwar Directorate, which is a public school, ranked last. The students' performance average in this school in math is (251) and in science is (255), and in both subjects together is (253). (For more details, refer to annex (1), which shows the performance average and the directorates rank in math and in science and in both subjects together in TIMSS 2011).

Moreover, the data was analyzed at the participating directorates' level. (For more details on the participating directorates' performance levels and the number of schools in these directorates, refer to annex 2)

Chapter Four

Change in Achievement in 1999 / 2003 / 2007 and 2011

Change in the Achievement of Sciences

Table (61) shows the Jordanian students' performance averages in science by gender, school location and supervising authority for the years (1999 , 2003 , 2007, 2011).

Table (61)
Performance averages in science for Jordanian students
by gender, school location and supervising authority in the years 1999, 2003, 2007, 2011

| Year | | | | |
|--------------------------|------|------|------|------|
| | 2011 | 2007 | 2003 | 1999 |
| The Kingdom | 449 | 482 | 475 | 450 |
| Gender | | | | |
| Males | 428 | 466 | 462 | 442 |
| Females | 471 | 499 | 489 | 460 |
| School Location | | | | |
| Urban | 457 | 484 | 478 | 456 |
| Rural | 422 | 476 | 468 | 436 |
| Supervising Authority | | | | |
| MoE | 436 | 468 | 470 | 440 |
| UNRWA | 482 | 541 | 471 | 477 |
| Private Education | 505 | 527 | 541 | 540 |

Figures (3, 4, 5, and 6) show the changes in science performance in 1999/ 2003 /2007/ 2011 by gender, location and supervising authority, and at the kingdom level

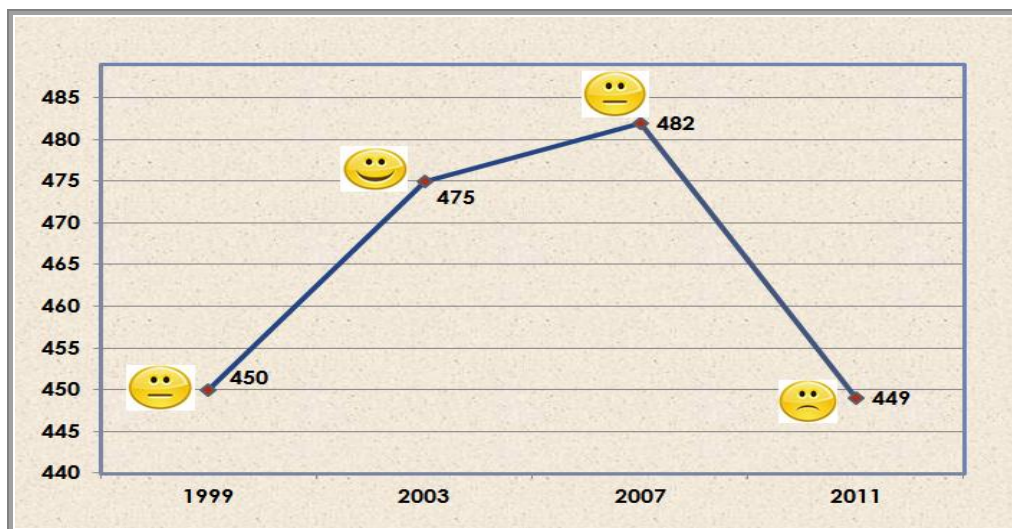
Change in Achievement in Science in 1999 / 2003 / 2007 and 2011 at the kingdom level

Students performance average in science was (475) in 2003 compared to (450) in 1999. In 2007, students' performance average was (482) and in 2011 was (449). (See figure 3). The difference between the averages of 2007 and 2011 is (33) scores and this difference is statistically significant in favor of 2007.

It should be noted that Jordanian students' performance in 1999 was below the international level with statistical significance. Jordanian students' performance level increased to (475) in 2003, which is one score higher than the international average which was (474). It increased to (482) in 2007, which is (12) scores over the international average which was (466). However, in 2011, the Jordanian students' performance was less than their performance in 2003 and in

2007, but it was not statistically significant from 1999. This is considered a serious issue affecting the educational system and need to be addressed by educators, politicians, decision-makers, policy-makers and the society as a whole so that this decline comes to an end. Moreover, there is need to upgrade students' achievement to reach the international levels, so that they can obtain a privileged position in a highly competitive world.

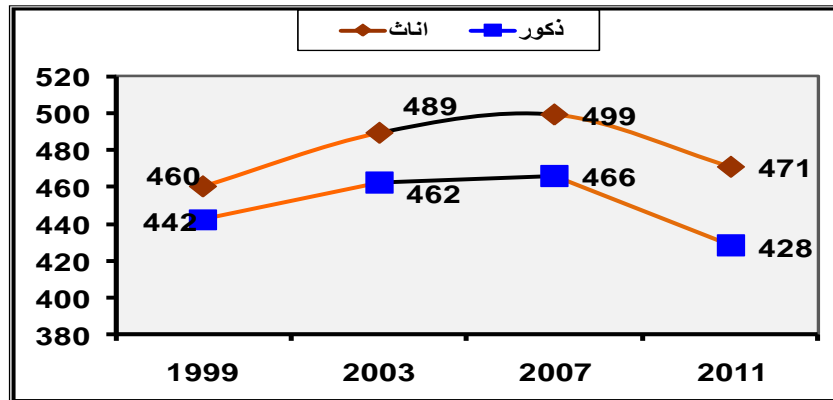
Figure (3)
Change in Achievement of Science in Jordan in 1999 / 2003/ 2007/ 2011



Changes in science achievement by gender

Figure (4) shows that females' performance average in science was (460) in 1999, and increased to (489) in 2003. Also It increased to (499) in 2007, but decreased to (471) in 2011. The difference between the performance averages in 2007 and 2011 was (28) and was statistically significant in favor of 2007.

Figure (4)
Change in Achievement of Science in Jordan in 1999/ 2003/ 2007/ 2011 by Gender



Statistically Insignificant difference

Statistically significant difference

In 1999, males' performance average in science was (442), increased to (462) in 2003 and to (466) in 2007. This average decreased to (428) in 2011. The difference between the performance averages in 2007 and in 2011 is (38) scores in favor of 2007 and this difference is statistically significant.

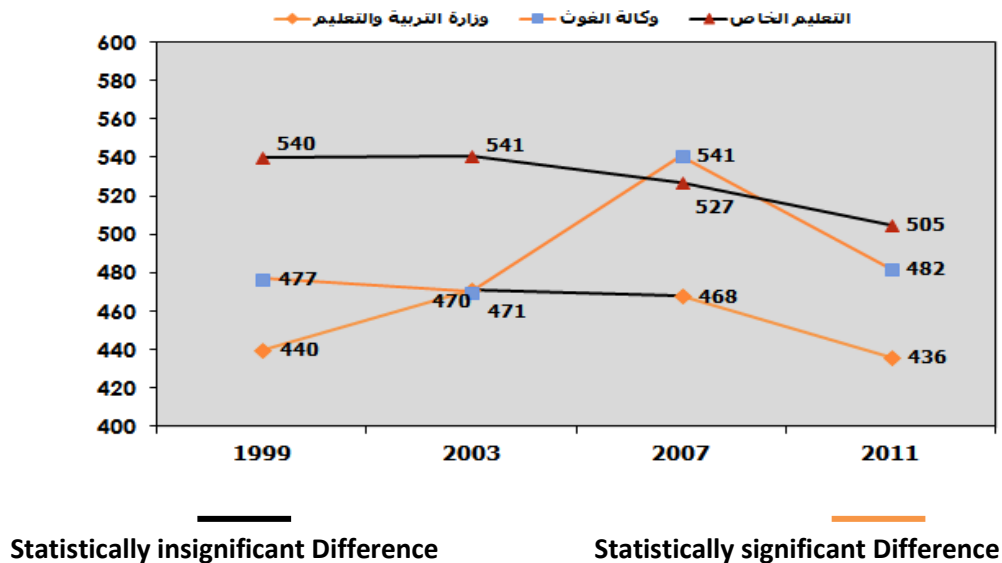
In general , females' achievement in science was better than males' achievement in 1999/ 2003, 2007/ 2011. In addition, the improvement at the females' achievements between 2003 and 2007 was better than the males' as it was (11)¹ scores in average compared to the improvement at males' achievements which was (4) scores. Although males and females performance showed decline in 2011, this decline was greater for males than it was for females.

Change in Achievement of Science by the Supervising Authority

Figure (5) shows that the performance average of MoE students was (440) in 1999 and increased to (470) in 2003. However, it decreased to (468) in 2007, and to (436) in 2011. The decline was (32) scores, and was statistically significant.

¹ Rounding errors may show some inconsistent differences

Figure (5)
Change in Achievement of Science in Jordan
in 1999/ 2003/ 2007/ 2011 by Supervising Authority



The private education students' performance average was (540) in 1999, and increased to (541) in 2003, but decreased to (527) in 2007, and decreased again to (505) in 2011. The decline was (22) score compared to 2007 and was statistically significant at ($\alpha = 0.05$).

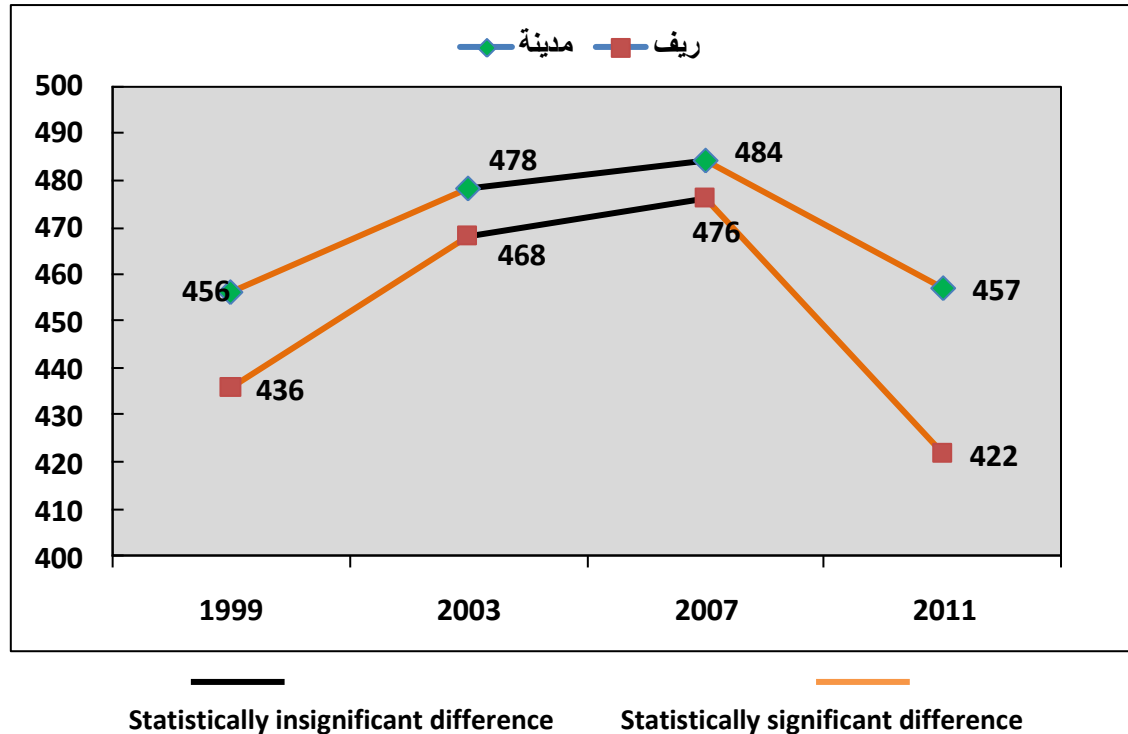
UNRWA students' performance average in science was (477) in 1999, decreased to (471) in 2003, then increased to (541) in 2007, and decreased again to (482) in 2011. This decline was (59) scores compared to 2007 and is statistically significant.

Consequently, it is clear that the most decline was at the UNRWA students, followed by the MoE students, then the private education students, and all these declines are statistically significant.

Change in Achievement of Science by Location

Figure (6) shows that the performance average of students in urban areas was (456) in 1999 increased to (478) in 2003, and increased again to (484) in 2007. This performance decreased to (457) in 2011. The decline was (27) scores in favor of 2007 and is statistically significant.

Figure (6)
Change in Achievement of Science in Jordan in 1999/ 2003/ 2007/ 2011 by Location



The performance average of students in rural areas in science was (436) in 1999, increased to (468) in 2003, and increased again to (476) in 2007. This performance decreased to (422) in 2011. This decline was (54) scores in favor of 2007 and this difference is statistically significant. Although students in urban areas and in rural areas showed decline in 2011, this decline was more for students in rural areas than for students in urban areas.

It should be noted that the performance average of students in urban areas was higher than the performance average of students in rural areas in 1999, as well as in 2003 and in 2011. This indicates the need to provide more support to the rural schools and to improve the levels of students in rural areas to reach the levels of their peers in urban schools.

Change in the distribution of percentages for students on the achievement levels in Science over the years: 1995, 1999, 2003, 2007, 2011

Table (62) shows the distribution of percentages for students according to international achievement levels for the participation countries in science in 1995, 1999, 2003, 2007, 2011.

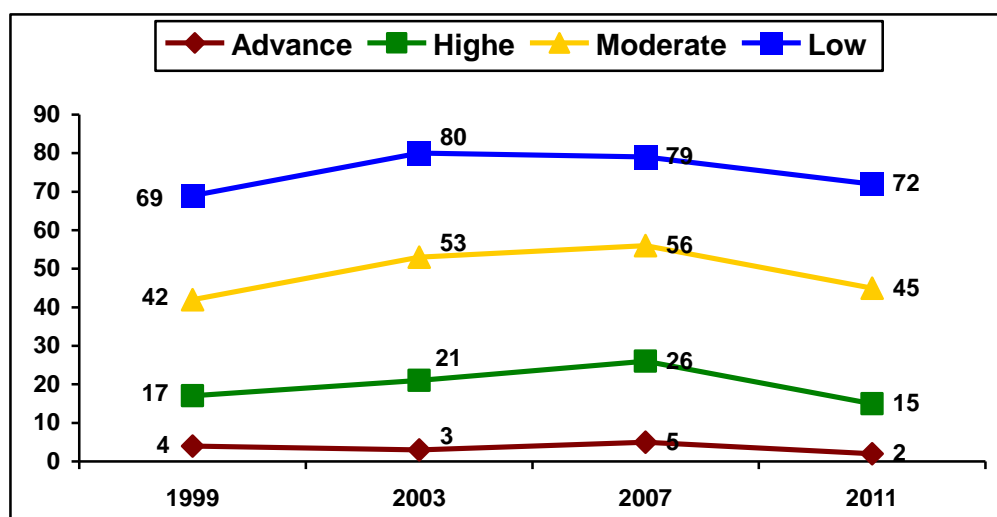
Table (62)

Percentages of students by international achievement levels in
science among participating countries in 1995, 1999, 2003, 2007, 2011

| Country | Low (400) | | | | | Moderate(475) | | | | | High (550) | | | | | Advanced (625) | | | | |
|-----------------------------|-----------|-----------|-----------|-----------|-----------|---------------|-----------|-----------|-----------|-----------|------------|-----------|-----------|-----------|-----------|----------------|----------|----------|-----------|-----------|
| | Year | | | | | Year | | | | | Year | | | | | Year | | | | |
| | 11 | 07 | 03 | 99 | 95 | 11 | 07 | 03 | 99 | 95 | 11 | 07 | 03 | 99 | 95 | 11 | 07 | 03 | 99 | 95 |
| Singapore | 96 | 93 | 95 | 95 | 99 | 87 | 80 | 85 | 84 | 91 | 69 | 61 | 66 | 60 | 64 | 40 | 32 | 33 | 29 | 29 |
| Taiwan | 96 | 95 | 98 | 96 | | 85 | 83 | 88 | 86 | | 60 | 60 | 63 | 61 | | 24 | 25 | 26 | 27 | |
| Korea | 97 | 97 | 98 | 96 | 95 | 86 | 85 | 88 | 81 | 81 | 57 | 54 | 57 | 50 | 50 | 20 | 17 | 17 | 19 | 17 |
| Japan | 97 | 96 | 98 | 97 | 97 | 86 | 85 | 86 | 84 | 85 | 57 | 55 | 53 | 52 | 54 | 18 | 17 | 15 | 16 | 18 |
| Russia | 96 | 95 | 93 | 92 | 92 | 81 | 76 | 70 | 73 | 71 | 48 | 41 | 32 | 41 | 38 | 14 | 11 | 6 | 15 | 11 |
| England | 93 | 94 | 96 | 94 | 93 | 76 | 79 | 81 | 76 | 75 | 44 | 48 | 48 | 45 | 43 | 14 | 17 | 15 | 17 | 15 |
| Slovenia | 96 | 97 | 96 | | 93 | 82 | 81 | 75 | | 69 | 48 | 45 | 33 | | 32 | 13 | 11 | 6 | | 8 |
| Australia | 92 | 92 | 95 | | 89 | 70 | 70 | 76 | | 69 | 35 | 33 | 40 | | 36 | 11 | 8 | 9 | | 10 |
| America | 93 | 92 | 93 | 87 | 87 | 73 | 71 | 75 | 67 | 68 | 40 | 38 | 41 | 37 | 38 | 10 | 10 | 11 | 12 | 11 |
| Hong Kong | 95 | 92 | 98 | 96 | 90 | 80 | 77 | 89 | 80 | 70 | 47 | 45 | 58 | 40 | 33 | 9 | 10 | 13 | 7 | 7 |
| New Zealand | 90 | | 94 | 88 | 89 | 67 | | 73 | 66 | 67 | 34 | | 35 | 35 | 34 | 9 | | 7 | 10 | 9 |
| Hungary | 92 | 96 | 97 | 96 | 95 | 75 | 80 | 82 | 83 | 80 | 39 | 46 | 46 | 53 | 44 | 9 | 13 | 14 | 19 | 12 |
| Finland | 96 | | | 96 | | 80 | | | 79 | | 41 | | | 43 | | 6 | | | 12 | |
| Sweden | 91 | 91 | 95 | | 97 | 68 | 69 | 75 | | 83 | 33 | 32 | 38 | | 52 | 6 | 6 | 8 | | 19 |
| Lithuania | 92 | 93 | 95 | 86 | 79 | 71 | 72 | 74 | 57 | 45 | 33 | 36 | 34 | 22 | 14 | 6 | 8 | 6 | 5 | 2 |
| Ukraine | 88 | 85 | | | | 64 | 58 | | | | 29 | 22 | | | | 6 | 3 | | | |
| Iran | 79 | 76 | 77 | 72 | 81 | 50 | 41 | 38 | 38 | 43 | 21 | 14 | 9 | 11 | 11 | 5 | 2 | 1 | 1 | 1 |
| Italy | 90 | 88 | 87 | 86 | | 65 | 62 | 59 | 59 | | 27 | 24 | 23 | 26 | | 4 | 4 | 4 | 6 | |
| Bahrain | 70 | 78 | 70 | | | 44 | 49 | 33 | | | 17 | 17 | 6 | | | 3 | 2 | 0 | | |
| Norway | 90 | 87 | 91 | | 94 | 62 | 58 | 63 | | 72 | 22 | 20 | 21 | | 32 | 3 | 2 | 2 | | 6 |
| Romania | 78 | 77 | 78 | 78 | 77 | 47 | 46 | 49 | 50 | 51 | 16 | 16 | 20 | 21 | 22 | 3 | 2 | 4 | 5 | 5 |
| Jordan | 72 | 79 | 80 | 69 | | 45 | 56 | 53 | 42 | | 15 | 26 | 21 | 17 | | 2 | 5 | 3 | 4 | |
| Macedonia | 53 | | 72 | 73 | | 30 | | 42 | 46 | | 10 | | 13 | 17 | | 2 | | 2 | 3 | |
| Oman | 59 | 61 | | | | 34 | 32 | | | | 11 | 8 | | | | 2 | 1 | | | |
| Armenia | 66 | | 77 | | | 37 | | 45 | | | 12 | | 14 | | | 1 | | 1 | | |
| Malaysia | 62 | 80 | 95 | 87 | | 34 | 50 | 71 | 59 | | 11 | 18 | 28 | 24 | | 1 | 3 | 4 | 5 | |
| Thailand | 74 | 80 | | 87 | | 39 | 48 | | 54 | | 10 | 17 | | 18 | | 1 | 3 | | 2 | |
| Chile | 79 | | 56 | 60 | | 43 | | 24 | 27 | | 12 | | 5 | 7 | | 1 | | 1 | 1 | |
| Palestine | 59 | 54 | 66 | | | 33 | 28 | 36 | | | 10 | 9 | 10 | | | 1 | 1 | 1 | | |
| Lebanon | 54 | 55 | 48 | | | 25 | 28 | 20 | | | 7 | 8 | 4 | | | 1 | 1 | 0 | | |
| Georgia | 62 | 61 | | | | 28 | 27 | | | | 6 | 5 | | | | 0 | 0 | | | |
| Syria | 63 | 76 | | | | 29 | 39 | | | | 6 | 9 | | | | 0 | 1 | | | |
| Tunisia | 72 | 77 | 52 | 68 | | 30 | 31 | 12 | 25 | | 5 | 4 | 1 | 3 | | 0 | 0 | 0 | 0 | |
| Indonesia | 54 | 65 | | | | 19 | 27 | | | | 3 | 4 | | | | 0 | 0 | | | |
| Ghana | 22 | 19 | 13 | | | 6 | 6 | 3 | | | 1 | 1 | 0 | | | 0 | 0 | 0 | | |
| Other participations | | | | | | | | | | | | | | | | | | | | |
| Massachusetts | 96 | 96 | | 93 | | 87 | 84 | | 75 | | 61 | 56 | | 43 | | 24 | 20 | | 15 | |
| Minnesota | 98 | 96 | | | 94 | 85 | 82 | | | 79 | 54 | 45 | | | 50 | 16 | 11 | | | 17 |
| Connecticut | 92 | | | 92 | | 74 | | | 74 | | 45 | | | 43 | | 14 | | | 14 | |
| Carolina | 94 | | | 87 | | 75 | | | 65 | | 42 | | | 34 | | 12 | | | 9 | |
| Alberta | 98 | | | 98 | 97 | 85 | | | 87 | 83 | 48 | | | 57 | 51 | 12 | | | 17 | 17 |
| Indiana | 95 | | 96 | 93 | | 78 | | 79 | 76 | | 43 | | 40 | 44 | | 10 | | 8 | 14 | |
| Dubai | 79 | 82 | | | | 57 | 58 | | | | 28 | 27 | | | | 7 | 6 | | | |
| Ontario | 96 | 96 | 97 | 95 | 88 | 76 | 77 | 81 | 72 | 61 | 35 | 37 | 41 | 34 | 26 | 6 | 7 | 7 | 7 | 5 |
| Quebec | 96 | 94 | 98 | 98 | 92 | 76 | 68 | 82 | 83 | 69 | 34 | 27 | 39 | 43 | 30 | 5 | 4 | 6 | 10 | 7 |

Also, figure (7) indicates the change in Jordanian students' percentages by international achievement levels over the years 1999, 2003, 2007, 2011

Figure (7)
Change in percentages of Jordanian students by international achievement levels in science in 1999, 2003, 2007, 2011



Regarding the international level, table (62) shows that the percentage of students who reached the advanced level in 2003, 2007 was (7%). This percentage declined by 2% compared to 1999. Jordan's percentage was 5% in 2007, while it was 3% in 2003, and 4% in 1999, which means that it is increased by 2% compared to 2003, and this increasing is statistically significant. In 2011, this percentage was 2% in Jordan, which is less than all of the past years, and is less than the international percentage in 2011, which was 5% with statistical significance.

At the high achievement level, the international percentage was (30%) in 1999 and 2003, compared to (27%) in 2007. So as This percentage declined by (3%) in 2007 compared to 2003. Jordan's percentage at this level was (21%) in 2003 and (17%) in 1999. It increased to (26%) in 2007, which means that it increased by (5%) compared to 2003 and this increase is statistically significant. In 2011, the Jordanian percentage was (15%). Therefore, the decline size was (11%) compared to 2007, which is also less than the similar international percentage by (17%). These differences are statistically significant.

At the moderate achievement level, the international percentage was (56%) in 2007, (61%) in 2003 and (58%) in 1999. This percentage declined by (5%) in 2007 compared to 2003. Jordan's percentage at this level was (56%) in 2007, and was (53%) in 2003, which means that it

increased by (3%) and this increase is statistically insignificant. In 2011, this percentage was (45%). Therefore, the decline size was (7%), and it is statistically significant.

At the low achievement level, the international percentage was (80%) in 2007, (84%) in 2003 and (81%) in 1999. Thus, it decreased by (4%) in 2007 compared to 2003. Jordan's percentage at this level declined by (1%) in 2007 compared to 2003, as it declined from 80% in 2003 to 79% in 2007, but this decline is not statistically insignificant. In addition, Jordan's percentage was (72%) in 2011 and the decline size was (7%) compared to 2007. It is noted that this decrease is the same compared to similar international level, which reached (79%), and these differences are statistically significant.

Change in Achievement in Math

Table (63) shows the performance averages in math for Jordanian students by gender, location and educational supervising authority in the years 1999/ 2003/ 2007/2011.

Table (63)
Performance Averages for Jordanian Students in Math by Gender,
School Location and the Supervising Authorities in 1999/ 2003/ 2007/ 2011

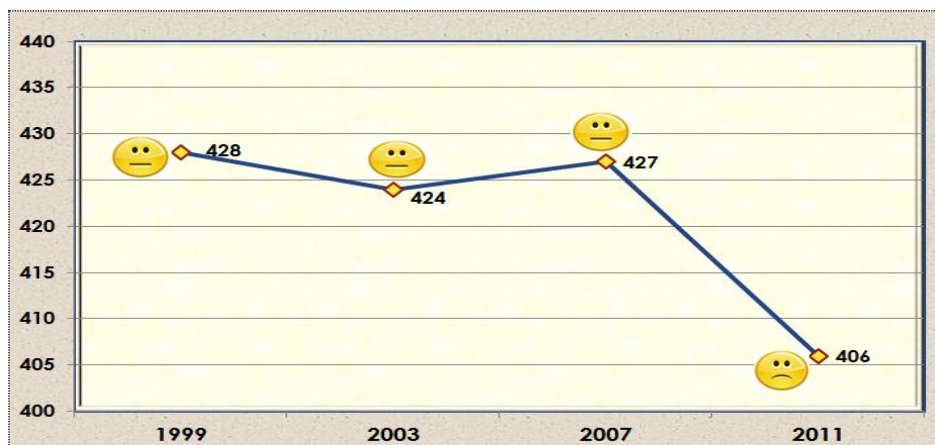
| | Year | | | |
|--------------------------|----------------------|----------------------|----------------------|----------------------|
| | The average for 2011 | The average for 2007 | The average for 2003 | The average for 1999 |
| The Kingdom | 406 | 427 | 424 | 428 |
| Gender | | | | |
| Males | 392 | 417 | 411 | 425 |
| Females | 420 | 438 | 439 | 431 |
| School Location | | | | |
| Urban | 414 | 431 | 430 | 432 |
| Rural | 378 | 418 | 414 | 413 |
| Supervising Authority | | | | |
| MoE | 392 | 410 | 418 | 415 |
| UNRWA | 437 | 594 | 420 | 473 |
| Private Education | 468 | 483 | 509 | 506 |

Figures (8) ,(9) ,(10), (11) show the changes in Math achievement between the years 1999/ 2003/ 2007/ 2011 by gender, location and supervising authority and at the Kingdom's level.

Change in math achievement over the years 1999/ 2003/ 2007/ 2011 at the kingdom Level.

Performance averages in math for Jordanian students were 428,424,427,406 in 1999/ 2003/ 2007/ 2011 respectively.(See figure (8)).

Figure (8)
Change in math achievement in Jordan in 1999/ 2003/ 2007/ 2011



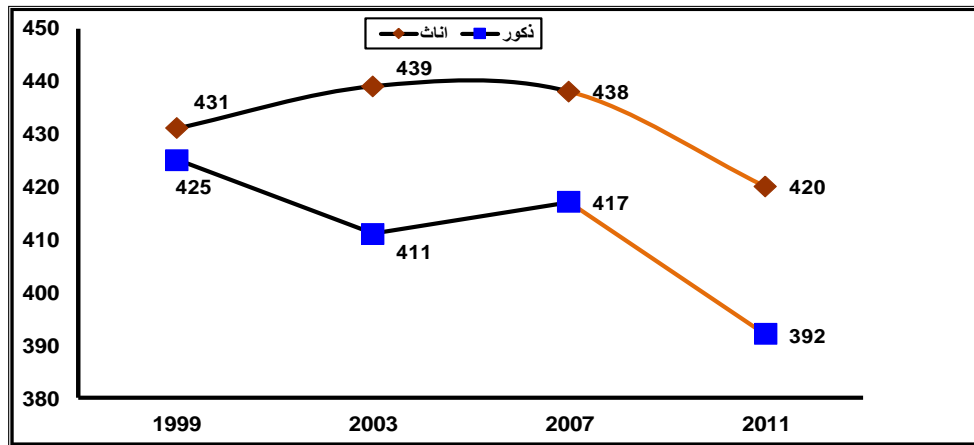
Statistical analyses showed that the performance differences in 1999/2003/2007 were not statistically significant, Which reflects the stable performance of Jordanian students in 1999/2003/2007. However, the performance average in 2011 was (406) which is a sign of markedly decline of (21) scores compared to 2007, and this decline is statistically significant.

Jordanian students' results in math and in international participations in the "Trends in Math and Science study (TIMSS)" or in "Program for International Student Assessment" (PISA) are below the international average. However, the result in 2011 reflected sharp decline compared to previous performance levels. This result requires serious revision of the educational system to maintain its previous achievements and progress to reach the international performance levels.

Change in the Achievement of Math by Gender

Figure (9) shows that female performance average in math was (431) in 1999 and increased to (439) in 2003. This average decreased to (438) in 2007 and decreased again to (420) in 2011. The difference between the performance averages in 2007 and 2011 was (18) in favor of 2007, and this difference is statistically significant.

Figure (9)
Change in the Achievement of Math by Gender in 1999,2003,2007,2011



Statistically insignificant difference

Statistically significant difference

Male performance average in Math was (425) in 1999 but decreased to (411) in 2003. It increased to (417) in 2007, but decreased to (392) in 2011. The difference between the performance averages in 2007 and 2011 was (25) scores in favor of 2007, and this difference is statistically significant.

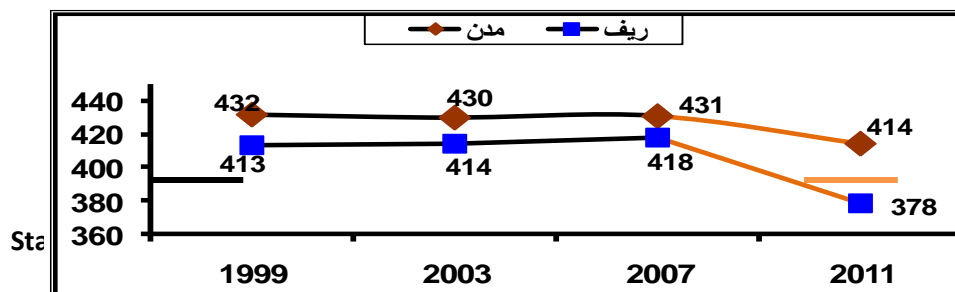
In sum, females' achievement in Math was better than males' achievement in 1999/ 2003/ 2007/ 2011. Although males and females showed decline in 2011, the decline size was more for males than females.

Change in the Achievement of Math by the School Location

Figure (10) shows that the performance average of students in rural areas was (413) in 1999 and increased to (414) in 2003. It increased again to (418) in 2007, then decreased to (378) in 2011. The difference between the performance averages in 2007 and 2011 was (40) scores in favor of 2011, and this difference is statistically significant.

Figure (10)

Change in the Achievement of Math by the School Location in 1999/ 2003/2007/ 2011



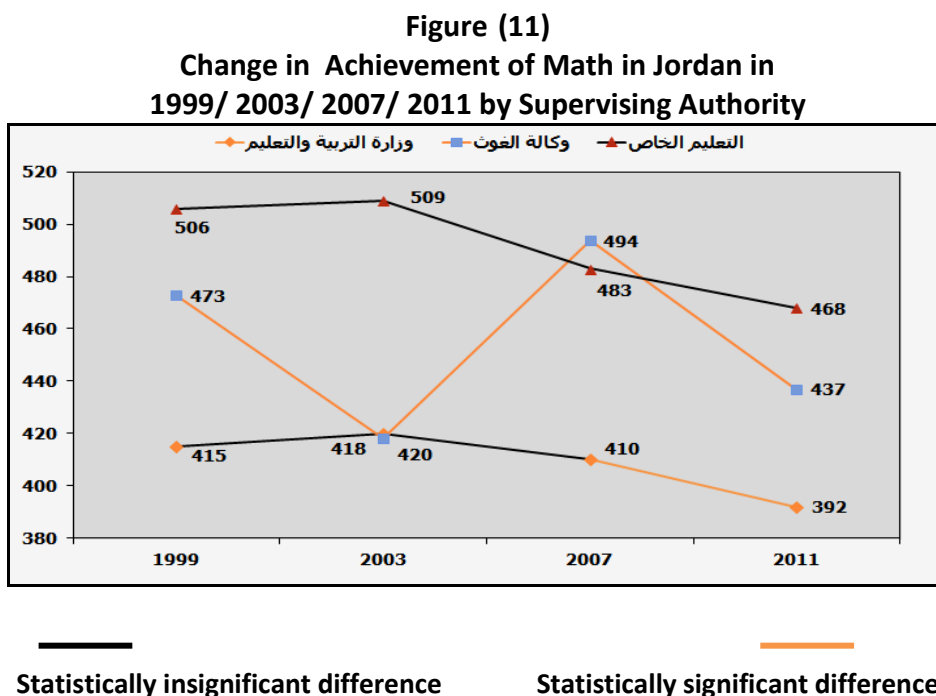
The performance average of students in urban areas in Math was (432) in 1999 but decreased to (430) in 2003. It increased to (431) in 2007, but decreased again to (414) in 2011. The difference between the performance averages in 2007 and 2011 was (17) scores in favor of 2007, and this difference is statistically significant.

Although students in urban areas and students in rural areas showed decline in 2011, but this decline was more for students in rural areas.

It should be noted that the performance average of students in urban areas was higher than the performance average of students in rural areas in Math in all of the past years, As this indicates that there is an urgent need to provide more support to the rural schools and to improve the levels of students in rural areas to reach the levels of their peers in urban schools.

Change in the Achievement of Math by the Supervising Authority

Figure (11) shows that the performance average of the MoE students in Math was (415) in 1999 and increased to (418) in 2003 but decreased to (410) in 2007 and all these changes are not statistically significant. It decreased again to (392) in 2011 by (18) scores, and this decline was statistically significance at ($0.05=\alpha$)



The performance average of private education students in math was (506) in 1999 and increased to (509) in 2003. The increase was (3) scores and it was not statistical significance at ($\alpha = 0.05$). In 2007, it was (483) with a decrease of (26) scores. It decreased again to (468) in 2011 with a decline of (15) scores compared to 2007 and it this decline is statistically significant.

The performance average of the UNRWA students in science was (473) in 1999, then it decreased to (420) in 2003. It increased to (494) in 2007 but decreased to (437) in 2011. The decline was (57) scores compared to 2007, and it is statistically significant.

Generally, it is clear that the most decline was at the UNRWA students, followed by the MoE students, then the private education students and all these declines are statistically significant.

Change in the distribution of percentages of students on achievement levels in Math over the years 1995, 1999, 2003, 2007, 2011

Table (64) shows change in the distribution of percentages of students on international achievement levels in Math in 1995, 1999, 2003, 2007, 2011

Table (64)
Percentages of students by international achievement
levels in Math in the participating countries in 1995/1999/ 2003/ 2007/ 2011

| Country | Low (400) | | | | | Moderate (475) | | | | | High (550) | | | | | Advanced (625) | | | | |
|-------------|-----------|----|----|----|-----|----------------|----|----|----|----|------------|----|----|----|----|----------------|----|----|----|----|
| | Year | | | | | Year | | | | | Year | | | | | Year | | | | |
| | 11 | 07 | 03 | 99 | 95 | 11 | 07 | 03 | 99 | 95 | 11 | 07 | 03 | 99 | 95 | 11 | 07 | 03 | 99 | 95 |
| Taiwan | 96 | 95 | 96 | 95 | | 88 | 86 | 85 | 85 | | 73 | 71 | 66 | 67 | | 49 | 45 | 38 | 37 | |
| Singapore | 99 | 97 | 99 | 99 | 100 | 92 | 88 | 93 | 94 | 98 | 78 | 70 | 77 | 77 | 84 | 48 | 40 | 44 | 42 | 40 |
| Korea | 99 | 98 | 98 | 99 | 97 | 93 | 90 | 90 | 91 | 89 | 77 | 71 | 70 | 70 | 67 | 47 | 40 | 35 | 32 | 31 |
| Hong Kong | 97 | 94 | 98 | 98 | 96 | 89 | 85 | 93 | 92 | 88 | 71 | 64 | 73 | 70 | 65 | 34 | 31 | 31 | 28 | 23 |
| Japan | 97 | 97 | 98 | 98 | 98 | 87 | 87 | 88 | 90 | 91 | 61 | 61 | 62 | 66 | 67 | 27 | 26 | 24 | 29 | 29 |
| Russia | 95 | 91 | 92 | 93 | 93 | 78 | 68 | 66 | 73 | 73 | 47 | 33 | 30 | 39 | 38 | 14 | 8 | 6 | 12 | 9 |
| Australia | 89 | 89 | 90 | | 90 | 63 | 61 | 65 | | 68 | 29 | 24 | 29 | | 33 | 9 | 6 | 7 | | 7 |
| England | 88 | 90 | 90 | 88 | 87 | 65 | 69 | 61 | 60 | 61 | 32 | 35 | 26 | 25 | 27 | 8 | 8 | 5 | 6 | 6 |
| Hungary | 88 | 91 | 95 | 93 | 94 | 65 | 69 | 75 | 75 | 74 | 32 | 36 | 41 | 43 | 40 | 8 | 10 | 11 | 13 | 10 |
| America | 92 | 92 | 90 | 87 | 86 | 68 | 67 | 64 | 62 | 61 | 30 | 31 | 29 | 30 | 26 | 7 | 6 | 7 | 7 | 4 |
| Romania | 71 | 73 | 79 | 79 | 79 | 44 | 46 | 52 | 51 | 52 | 19 | 20 | 21 | 20 | 21 | 5 | 4 | 4 | 4 | 4 |
| Lithuania | 90 | 90 | 90 | 85 | 81 | 64 | 65 | 63 | 53 | 50 | 29 | 30 | 28 | 18 | 17 | 5 | 6 | 5 | 3 | 2 |
| New Zealand | 84 | | 88 | 84 | 89 | 57 | | 59 | 57 | 64 | 24 | | 24 | 26 | 28 | 5 | | 5 | 6 | 6 |
| Ukraine | 81 | 76 | | | | 53 | 46 | | | | 22 | 15 | | | | 5 | 3 | | | |
| Slovenia | 93 | 92 | 90 | | 90 | 67 | 65 | 60 | | 60 | 27 | 25 | 21 | | 22 | 4 | 4 | 3 | | 4 |
| Italy | 90 | 85 | 86 | 82 | | 64 | 54 | 56 | 53 | | 24 | 17 | 19 | 21 | | 3 | 3 | 3 | 4 | |
| Armenia | 76 | | 82 | | | 49 | | 54 | | | 18 | | 21 | | | 3 | | 2 | | |
| Macedonia | 61 | | 66 | 70 | | 35 | | 34 | 40 | | 12 | | 9 | 13 | | 3 | | 1 | 2 | |
| Georgia | 62 | 56 | | | | 36 | 26 | | | | 13 | 7 | | | | 3 | 1 | | | |
| Iran | 55 | 51 | 55 | 61 | 59 | 26 | 20 | 20 | 26 | 24 | 8 | 5 | 3 | 6 | 4 | 2 | 1 | 0 | 1 | 0 |
| Malaysia | 65 | 82 | 93 | 93 | | 36 | 50 | 66 | 70 | | 12 | 18 | 30 | 36 | | 2 | 2 | 6 | 10 | |
| Thailand | 62 | 66 | | 79 | | 28 | 34 | | 45 | | 8 | 12 | | 17 | | 2 | 3 | | 3 | |
| Bahrain | 53 | 49 | 51 | | | 26 | 19 | 17 | | | 8 | 3 | 2 | | | 1 | 0 | 0 | | |
| Sweden | 89 | 90 | 91 | | 96 | 57 | 60 | 64 | | 81 | 16 | 20 | 24 | | 46 | 1 | 2 | 3 | | 12 |
| Palestine | 52 | 39 | 46 | | | 25 | 15 | 19 | | | 7 | 3 | 4 | | | 1 | 0 | 0 | | |
| Lebanon | 73 | 74 | 68 | | | 38 | 36 | 27 | | | 9 | 10 | 4 | | | 1 | 1 | 0 | | |
| Norway | 87 | 85 | 81 | | 90 | 51 | 48 | 44 | | 64 | 12 | 11 | 10 | | 26 | 1 | 0 | 0 | | 4 |
| Chile | 57 | | 41 | 46 | | 23 | | 15 | 16 | | 5 | | 3 | 4 | | 1 | | 0 | 1 | |

| | | | | | | | | | | | | | | | | | | | | |
|----------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|
| Jordan | 55 | 61 | 60 | 61 | | 26 | 35 | 30 | 33 | | 6 | 11 | 8 | 12 | | 0 | 1 | 1 | 3 | |
| Oman | 39 | 41 | | | | 16 | 14 | | | | 4 | 2 | | | | 0 | 0 | | | |
| Tunisia | 61 | 61 | 55 | 78 | | 25 | 21 | 15 | 34 | | 5 | 3 | 1 | 5 | | 0 | 0 | 0 | 0 | |
| Finland | 90 | | | 96 | | 57 | | | 77 | | 14 | | | 33 | | 0 | | | 5 | |
| Syria | 43 | 47 | | | | 17 | 17 | | | | 3 | 3 | | | | 0 | 0 | | | |
| Indonesia | 43 | 48 | | | | 15 | 19 | | | | 2 | 4 | | | | 0 | 0 | | | |
| Other participations | | | | | | | | | | | | | | | | | | | | |
| Massachusetts | 98 | 95 | | 92 | | 88 | 82 | | 69 | | 57 | 52 | | 33 | | 19 | 16 | | 8 | |
| Carolina | 95 | | | 87 | | 78 | | | 59 | | 44 | | | 27 | | 14 | | | 6 | |
| Minnesota | 97 | 97 | | | 94 | 83 | 81 | | | 73 | 49 | 41 | | | 36 | 13 | 8 | | | 7 |
| Connecticut | 91 | | | 90 | | 69 | | | 68 | | 37 | | | 33 | | 10 | | | 9 | |
| Indiana | 95 | | 94 | 93 | | 74 | | 68 | 71 | | 35 | | 27 | 32 | | 7 | | 5 | 7 | |
| Quebec | 98 | 97 | 99 | 99 | 99 | 82 | 78 | 88 | 93 | 90 | 40 | 37 | 45 | 60 | 54 | 6 | 8 | 8 | 18 | 14 |
| Dubai | 79 | 74 | | | | 53 | 47 | | | | 23 | 17 | | | | 5 | 3 | | | |
| Ontario | 94 | 95 | 97 | 96 | 91 | 71 | 74 | 75 | 72 | 65 | 31 | 33 | 34 | 32 | 26 | 4 | 6 | 6 | 6 | 3 |
| Alberta | 95 | | | 97 | 97 | 69 | | | 81 | 79 | 24 | | | 40 | 39 | 3 | | | 7 | 6 |

Figure (12)
Change in percentages of Jordanian students by international achievement levels in Math in 1999/ 2003/ 2007/ 2011

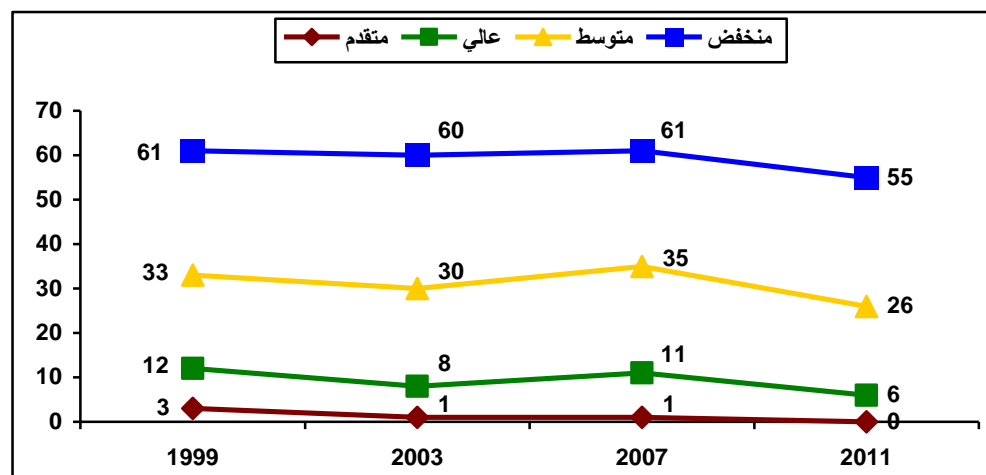


Table (64) shows that the percentage of students who reached the advanced level in Math in 2003 and 2007 was (8%) at the international level. This percentage decreased by (2%) compared to 1999, and by (3%) compared to 1995. Jordan's percentage was (1%) in 2003 and in 2007. This percentage decreased by (2%) compared to 1999. In 2011, it was (0%) which is less than 2007, and less than the similar international percentage in 2011 which was (3%).

At the high achievement level, the international percentage was (24%) in 2007, compared to (28%) in 2003, and so the difference is (4%) in favor of 2003.

In Jordan, this percentage was (11%) in 2007 and (8%) in 2003. Thus, this percentage increased by (3%) in 2007 compared to 2003, which is statistically significant. In 2011, the percentage was (6%) in Jordan. Thus, the decline size was (5%) in favor of 2007. It is also less than the similar International percentage by (11%) and these declines are statistically significant.

At moderate achievement level, the international percentage was (50%) in 2007, and (56%) in 2003. Thus, the difference between 2003 and 2007 was (6%) in favor of 2003. Jordan's percentage was (35%) in 2007 and (30%) in 2003 and this difference is statistically insignificant. In 2011, Jordan's percentage was (26 %), and so it is less than 2007 by (9%) and less than the similar International percentage by (20%), and these differences are statistically significant.

At the low achievement level, the international percentage was (75%) in 2007, and(80%) in 2003, and so the difference was (5%) in favor of 2003.

Jordan's percentage was (61%) in 2007 compared to (60%) in 2003, and the difference between these percentages is not statistically significant. In 2011, Jordan's percentage was (55%), and decline size was (6%) compared to 2007, and it is less than the similar international level by (20%), and these differences are statistically significant.

Chapter Five

Selected Characteristics of the Student, the Teacher , and the Principal and their relationship with the achievement in Math and Science

- Variables Derived from the Student's Questionnaire.
 - Time spent by students in the completion of homework

Table No. (65)

Weekly Time spent by students to complete their Science homework's and their achievement in science

| No. | Country | ≥ hr. and more | | 45m – 3 hr. | | 45 m or less | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | % Students' Percentage | Performance Average | % Students' Percentage | Performance Average | % Students' Percentage | Performance Average |
| 1. | Jordan | 8 | 447 | 32 | 464 | 61 | 456 |
| 2. | Palestine | 7 | 388 | 31 | 424 | 62 | 427 |
| 3. | Bahrain | 6 | 415 | 25 | 465 | 69 | 457 |
| 4. | Tunisia | 4 | 416 | 20 | 428 | 76 | 445 |
| 5. | Qatar | 4 | 398 | 28 | 445 | 68 | 414 |
| 6. | Oman | 4 | 373 | 17 | 411 | 79 | 432 |
| 7. | UAE | 4 | 443 | 25 | 479 | 71 | 464 |
| 8. | Saudi Arabia | 3 | 401 | 14 | 425 | 83 | 441 |
| 9. | Dubai/UAE | 4 | 462 | 33 | 502 | 63 | 481 |
| 10. | Abu Dubai/UAE | 4 | 439 | 22 | 471 | 74 | 462 |
| Arab Average | | 5 | 410 | 24 | 443 | 71 | 442 |
| International Average | | 5 | 448 | 29 | 487 | 67 | 482 |

Table (65) shows the weekly time spent in the completion of science homework by grade 8 students in the Arab countries participating in (TIMSS). The results showed that 32% of Jordanian students spend more than 45 minutes and less than 3 hours to complete their science homework, and the performance average of those students was 464. Moreover, the results showed that 61% of Jordanian students spend 45 minutes or less to complete their Science homework weekly, and the performance average of these students was 456. The results also showed that 8% of Jordanian students spend 3 hours or more to complete their science homework, and their performance average was 447.

On the Arab level, the percentages were as follows:

Three hours or more (5%), more than 45 minutes and less (24%), 3 hours (24%), 45 minutes or less, (71%), where the performance averages for the three categories came in the same order: 410, 443, 442. At the international level, the percentages were as follows: 5%, 29%, 67%, and the performance average were: 448 487 482 respectively. The percentages and performance averages in science, at the Jordanian, Arab, or international levels, show a curvilinear

relationship between the student's time spent on homework and achievement in science, noting that the most time spent on homework is accompanied by the lowest performance. This might be attributed to the fact that low performing students need more time to do their homework.

Table (66) shows the weekly time spent by grade 8 students in the Arab countries who participated in (TIMSS) to complete their Math homework .

Table No. (66)
Weekly Time spent by students to complete their Math homework and their achievement in this topic weekly

| No. | Country | ≥ hr. and more | | 45m – 3 hr. | | 45 m or less | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average |
| 1. | Tunisia | 21 | 420 | 43 | 431 | 37 | 424 |
| 2. | Lebanon | 19 | 447 | 36 | 456 | 45 | 447 |
| 3. | Morocco | 18 | 388 | 34 | 389 | 48 | 363 |
| 4. | Syria | 16 | 385 | 37 | 400 | 47 | 368 |
| 5. | Palestine | 13 | 383 | 30 | 409 | 57 | 412 |
| 6. | Bahrain | 12 | 383 | 31 | 427 | 57 | 410 |
| 7. | Jordan | 12 | 405 | 36 | 419 | 52 | 409 |
| 8. | Qatar | 9 | 430 | 31 | 443 | 60 | 392 |
| 9. | UAE | 9 | 455 | 31 | 469 | 60 | 452 |
| 10. | Oman | 6 | 349 | 20 | 372 | 74 | 373 |
| 11. | Saudi Arabia | 5 | 356 | 18 | 391 | 77 | 398 |
| 12. | Dubai/UAE | 11 | 478 | 38 | 492 | 51 | 470 |
| 13. | Abu Dubai/UAE | 9 | 449 | 29 | 459 | 62 | 446 |
| Arab Average | | 13 | 401 | 32 | 419 | 56 | 404 |
| International Average | | 15 | 464 | 38 | 478 | 48 | 460 |

The results showed that the percentages of Jordan in the three categories: 3 hours or more, more than 45 minutes and less than 3 hours, and 45 minutes or less were 12%, 36%, 52% respectively, and the performance average corresponding to these percentages were 405, 419 & 409, and on the Arab level, the percentages were 13%, 32%, 56% respectively and the performance averages were 401, 419 & 404 respectively. On the international level, the percentages were 15%, 38%, 48%, respectively and the performance averages were respectively 464, 474 & 460.

The values of the percentages and the performance average in Math at the Jordanian, Arab and international levels indicate a curvilinear relationship between the student's time spent on homework and achievement in Math with noting that the greatest time is accompanied by the lowest performance in math.

Students' Engagement in classes

Students' engagement scale in Math lessons was derived based on their agreement on the following five items that are included in the questionnaire:

1. I know the work the teacher expects from me to do.
2. I think of matters irrelevant to the classes .
3. I can understand my teacher easily.
4. I can about what the teacher says.
5. My teacher gives me exciting things to do.

Table (67) shows the percentages distribution of the Arab states students of Arab States on the students' engagement scale in math classes, which divides students into three categories "*engaged*", "*engaged to some extent*" and "*not engaged*".

Table (67)
Students' engagement in classes and their achievement in Math

| No. | Country | Engaged | | Engaged to some extent | | Not engaged | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | Syria | 47 | 395 | 45 | 372 | 8 | 361 |
| 2. | Morocco | 45 | 387 | 47 | 363 | 8 | 354 |
| 3. | Jordan | 44 | 435 | 48 | 393 | 8 | 369 |
| 4. | Tunisia | 42 | 432 | 48 | 420 | 10 | 419 |
| 5. | Palestine | 42 | 427 | 49 | 395 | 9 | 362 |
| 6. | Oman | 38 | 401 | 54 | 355 | 9 | 311 |
| 7. | Lebanon | 35 | 459 | 52 | 447 | 13 | 433 |
| 8. | UAE | 31 | 473 | 54 | 450 | 14 | 444 |
| 9. | Bahrain | 30 | 427 | 54 | 408 | 16 | 389 |
| 10. | Saudi Arabia | 30 | 421 | 56 | 387 | 14 | 369 |
| 11. | Qatar | 28 | 441 | 54 | 405 | 18 | 386 |
| 12. | Abu Dubai/UAE | 30 | 471 | 55 | 442 | 15 | 434 |
| 13. | Dubai/UAE | 29 | 488 | 54 | 477 | 16 | 466 |
| Arab Average | | 37 | 427 | 51 | 400 | 12 | 382 |
| International Average | | 25 | 484 | 54 | 468 | 21 | 449 |

The percentages of Jordanians students were as follows: 44% engaged, 48% engaged to some extent, and 10% were not engaged. At the Arab level the percentages were as follows: 37% engaged, 51%, engaged to some extent and 12% not engaged. At the international level the percentages were as follows: 25% engaged, 54% engaged to some extent, 21% not engaged. These percentages reflect a better level of engagement in math classes of the Jordanian students compared to the Arab and international levels. The performance averages of students at the Jordanian, Arab or international levels indicate a positive relationship between the achievement in Math and students' engagement in math classes.

Table (68) shows the distribution of Arab students' percentages on the students' engagement scale in science classes. The results showed that the degree of engagement of Jordanian students was better compared to the engagement of their counterparts on the Arab and international levels, and that the relationship between achievement in science and students' engagement in science classes is a appositive relationship at the Jordanian, Arab and international levels.

Table No. (68)
Students' engagement in classes and their achievement in Science

| No. | Country | *Engaged | | Engaged to some extent | | Not engaged | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | Tunisia | 55 | 446 | 39 | 430 | 6 | 431 |
| 2. | Jordan | 46 | 483 | 46 | 436 | 8 | 395 |
| 3. | Palestine | 44 | 448 | 47 | 406 | 9 | 381 |
| 4. | Oman | 42 | 460 | 50 | 406 | 8 | 349 |
| 5. | UAE | 38 | 487 | 49 | 454 | 12 | 445 |
| 6. | Saudi Arabia | 36 | 462 | 51 | 427 | 12 | 411 |
| 7. | Bahrain | 34 | 479 | 51 | 447 | 15 | 428 |
| 8. | Qatar | 32 | 464 | 51 | 409 | 17 | 378 |
| | Dubai/UAE | 39 | 501 | 48 | 482 | 13 | 461 |
| | Abu Dubai/UAE | 38 | 486 | 50 | 448 | 12 | 445 |
| Arab Average | | 41 | 466 | 48 | 427 | 11 | 402 |
| International Average | | 29 | 508 | 51 | 479 | 21 | 457 |

* See the definitions of the measurement categories in appendix (5)

- **Teachers' Involvement of students in the classes**

This scale is built based on teachers' responses to four items:

1. Summarizing what students should have learned.
2. Using questions to explain reasons and elucidations.
3. Encouraging all students to enhance their performance.
4. Praising and recognizing students for exerting good efforts.

Table (69) shows the distribution of percentages of Arab States students on the scale of Teachers' Involvement of students in the classes, which divides students into three categories according to the Teachers' Involvement of students in the classes. These categories are: **most of the classes**, **about half of classes**, and **some classes**. The results showed that 89% of Jordanian students are involved in most of the classes by science teachers and their performance average in Science was (451), which is better than the Arab average, but below the international average. The percentage of students who are involved in half of science classes by their teachers in Jordan was 9%, which is below Arab and international percentages. Students' performance average was (441), which is below the international average for students who fall into the same category. The results showed that 2% of the Jordanian students are engaged in some science classes by their teachers and this percentage comes between the Arab and international percentages.

Table No. (69)
Students' participation in Science classes during teaching

| No. | Country | Most of the classes | | About half of classes | | Some classes | |
|-----|--------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | Palestine | 94 | 422 | 6 | 398 | 0 | ~ |
| 2. | UAE | 94 | 462 | 6 | 471 | 0 | ~ |
| 3. | Qatar | 93 | 420 | 6 | 411 | 1 | ~ |
| 4. | Morocco | 89 | 377 | 10 | 375 | 1 | ~ |
| 5. | Jordan | 89 | 451 | 9 | 441 | 2 | ~ |
| 6. | Saudi Arabia | 89 | 438 | 11 | 428 | 0 | ~ |
| 7. | Lebanon | 88 | 406 | 11 | 404 | 1 | ~ |
| 8. | Syria | 88 | 424 | 11 | 437 | 1 | ~ |
| 9. | Oman | 85 | 422 | 15 | 406 | 0 | ~ |

| | | | | | | | |
|------------------------------|---------------|-----------|------------|-----------|------------|----------|------------|
| 10. | Bahrain | 84 | 460 | 16 | 418 | 0 | ~ |
| 11. | Tunisia | 83 | 438 | 14 | 439 | 4 | 437 |
| 12. | Dubai/UAE | 95 | 484 | 5 | 411 | 0 | ~ |
| 13. | Abu Dubai/UAE | 93 | 459 | 7 | 495 | 0 | ~ |
| Arab Average | | 87 | 429 | 10 | 421 | 1 | 437 |
| International Average | | 80 | 478 | 17 | 474 | 3 | 509 |

Table (70) shows that students' participation in math classes, as the percentage of the Jordanian students who are involved in about half of the classes was 13%, and in some classes was 1% .

Table No. (70)
Students' participation in Math classes during instruction

| No. | Country | Most of the classes | | About half of the classes | | Some classes | |
|------------------------------|---------------|------------------------|---------------------|---------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | UAE | 93 | 456 | 7 | 449 | 1 | ~ |
| 2. | Bahrain | 90 | 413 | 9 | 378 | 1 | ~ |
| 3. | Palestine | 90 | 405 | 10 | 397 | 1 | ~ |
| 4. | Qatar | 89 | 417 | 11 | 363 | 0 | ~ |
| 5. | Syria | 88 | 379 | 11 | 376 | 1 | ~ |
| 6. | Saudi Arabia | 87 | 397 | 12 | 381 | 1 | ~ |
| 7. | Jordan | 86 | 409 | 13 | 385 | 1 | ~ |
| 8. | Morocco | 86 | 374 | 14 | 355 | 0 | ~ |
| 9. | Lebanon | 86 | 452 | 12 | 437 | 3 | 433 |
| 10. | Tunisia | 84 | 427 | 14 | 412 | 2 | ~ |
| 11. | Oman | 82 | 373 | 17 | 334 | 1 | ~ |
| 12. | Dubai/UAE | 95 | 447 | 5 | 505 | 0 | ~ |
| 13. | Abu Dubai/UAE | 91 | 482 | 9 | 423 | 0 | ~ |
| Arab Average | | 87 | 409 | 12 | 388 | 1 | 433 |
| International Average | | 80 | 469 | 17 | 459 | 3 | 484 |

The results also indicated that the performance average of the Jordanian students who participated in most of the classes was better than the performance average of students who participated in about half of the classes. Interestingly, students' performance average who

participated in some classes was better at both the international and Arab levels and better than the performance average of students in other categories, both in Math or Science.

- **Students' confidence in learning**

The study derived a scale for student's confidence in his/ her ability to learn Science and Math. This scale divided students into three categories according to the degree of confidence: **high, moderate, and unconfident**. Table (71) shows the distribution students' percentages by their confidence in their ability to learn science. Jordan percentages on the three categories were as follows: 29%, 56% and 15% respectively. Jordanian students' performance average in science according to these categories and in the same order are as follows: 507, 440 and 40. These averages were the highest when compared to their counterparts in the participating Arab countries, but were lower than the similar international values. The performance averages on the Jordanian, Arab and international levels show a positive relationship between the achievement in science and students' confidence in learning.

Table (71)
Students' confidence in learning Science and achievement in science

| No. | Country | *High | | Moderate | | Unconfident | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | Tunisia | 37 | 464 | 51 | 427 | 11 | 414 |
| 2. | Oman | 29 | 487 | 57 | 407 | 14 | 360 |
| 3. | Jordan | 29 | 507 | 56 | 440 | 15 | 407 |
| 4. | Saudi Arabia | 29 | 481 | 54 | 426 | 17 | 401 |
| 5. | UAE | 29 | 512 | 52 | 454 | 19 | 428 |
| 6. | Qatar | 28 | 496 | 51 | 404 | 22 | 368 |
| 7. | Palestine | 23 | 480 | 55 | 414 | 22 | 379 |
| 8. | Bahrain | 23 | 511 | 52 | 450 | 25 | 418 |
| 9. | Dubai/UAE | 32 | 528 | 50 | 474 | 18 | 446 |
| 10. | Abu Dubai/UAE | 27 | 509 | 53 | 450 | 20 | 429 |
| Arab Average | | 28 | 492 | 54 | 428 | 18 | 397 |
| International Average | | 20 | 536 | 49 | 482 | 31 | 450 |

* See the definitions of the measurement categories in appendix (5)

Table (72) shows the distribution of students' percentage by the degree of their confidence in their ability to learn math. Jordan's percentages in the three categories were as follows: 22%, 54%, 24% respectively. Jordanian students' performance averages in Math according to these categories were: 482, 399, 365. And on the Arab level the performance averages were as follows: 474, 405, 372, while on the international level the performance averages were as follows: 539, 478 & 435.

The values of the performance averages by the degree of students' confidence in their ability to learn science or math indicate a positive relationship between the achievement in math and science on one hand and students' confidence in their ability to learn.

Table (72)
Students' Confidence in Learning Math and Achievement in Math

| No. | Country | High | | Moderate | | Unconfident | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | Jordan | 22 | 482 | 54 | 399 | 24 | 365 |
| 2. | Saudi Arabia | 21 | 464 | 52 | 392 | 27 | 348 |
| 3. | UAE | 20 | 516 | 53 | 451 | 27 | 422 |
| 4. | Lebanon | 19 | 500 | 53 | 447 | 28 | 420 |
| 5. | Qatar | 18 | 484 | 52 | 404 | 30 | 379 |
| 6. | Palestine | 17 | 478 | 54 | 404 | 29 | 364 |
| 7. | Oman | 17 | 457 | 59 | 362 | 24 | 322 |
| 8. | Bahrain | 16 | 490 | 45 | 417 | 39 | 372 |
| 9. | Syria | 15 | 426 | 56 | 382 | 29 | 359 |
| 10. | Tunisia | 14 | 488 | 50 | 426 | 36 | 398 |
| 11. | Morocco | 13 | 434 | 54 | 374 | 33 | 347 |
| 12. | Dubai/UAE | 21 | 538 | 49 | 476 | 30 | 441 |
| 13. | Abu Dubai/UAE | 20 | 512 | 54 | 443 | 26 | 413 |
| Arab Average | | 17 | 474 | 53 | 405 | 30 | 372 |
| International Average | | 14 | 539 | 45 | 478 | 41 | 435 |

- **Students' appreciation for the subject**

The study built the scale of the students' appreciation for science and Math and this scale divided students into three categories by the degree of appreciation for science and math: **high**, **moderate**, and **low**. Table (73) indicates that the distribution of Jordan's percentages on the three categories were as follows: 66%, 25% & 8% respectively. The performance averages in Science for Jordanian students by these categories were as follows: 468, 437, 403, and these averages were less than the similar international values. At the Jordanian level, the performance averages for the first two categories were higher than the Arab performance averages and were less than the Arab average in the last category.

Table (73)
Students' appreciation for Science and achievement in Science

| No. | Country | *High Value | | Moderate Value | | Low Value | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | Oman | 69 | 441 | 24 | 393 | 7 | 361 |
| 2. | Jordan | 66 | 468 | 25 | 437 | 8 | 403 |
| 3. | Tunisia | 62 | 441 | 27 | 436 | 12 | 438 |
| 4. | Palestine | 62 | 437 | 27 | 406 | 11 | 379 |
| 5. | Saudi Arabia | 53 | 446 | 32 | 433 | 15 | 419 |
| 6. | UAE | 51 | 474 | 30 | 459 | 18 | 453 |
| 7. | Qatar | 51 | 447 | 30 | 403 | 19 | 381 |
| 8. | Bahrain | 49 | 473 | 31 | 447 | 21 | 430 |
| 9. | Dubai/UAE | 52 | 494 | 29 | 479 | 19 | 476 |
| 10. | Abu Dubai/UAE | 50 | 472 | 31 | 453 | 18 | 450 |
| Arab Average | | 58 | 453 | 28 | 427 | 14 | 408 |
| International Average | | 41 | 502 | 33 | 477 | 26 | 457 |

Table (74) shows the distribution of students' percentages by the degree of appreciation for math. The percentages of Jordanian students on the three categories were: 69%, 24% and 7%,

* See the definitions of the measurement categories in appendix (5)

and the total performance averages in math for Jordanian students according to these categories were: 422, 393 and 340, while the similar Arab averages were: 421, 395 and 365. At the international level, they were: 482, 463 and 439, and all of which were higher than the Arab averages or Jordanian averages that is similar to Arab averages. The values of the performance average by the degree of students' appreciation of Math or science reflects a positive relationship between achievement in Math and science on one hand, and the students' degree of appreciation variable for the subject at the Jordanian, Arab, and international levels on the other hand.

Table (74)
Students' appreciation for Math and achievement in Math

| No. | Country | *High Value | | Moderate Value | | Low Value | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | Morocco | 78 | 380 | 18 | 351 | 4 | 334 |
| 2. | Jordan | 69 | 422 | 24 | 393 | 7 | 340 |
| 3. | Oman | 67 | 386 | 26 | 342 | 7 | 298 |
| 4. | Palestine | 67 | 421 | 26 | 381 | 8 | 346 |
| 5. | Syria | 65 | 392 | 27 | 367 | 8 | 346 |
| 6. | Tunisia | 64 | 434 | 28 | 414 | 8 | 397 |
| 7. | UAE | 54 | 466 | 36 | 451 | 11 | 427 |
| 8. | Lebanon | 53 | 461 | 36 | 442 | 11 | 419 |
| 9. | Saudi Arabia | 51 | 408 | 35 | 387 | 13 | 363 |
| 10. | Qatar | 49 | 432 | 35 | 401 | 16 | 370 |
| 11. | Bahrain | 48 | 425 | 36 | 411 | 16 | 372 |
| | Abu Dubai/UAE | 55 | 462 | 35 | 440 | 10 | 412 |
| | Dubai/UAE | 51 | 484 | 37 | 478 | 12 | 453 |
| Arab Average | | 60 | 421 | 30 | 395 | 10 | 365 |
| International Average | | 46 | 482 | 39 | 463 | 15 | 439 |

- **Student's attitude towards the subject**

The study built the scale of the students' attitudes towards science based on his/her responses on a five-item –scale, the students were divided into three categories: *like*, *like to some extent*, and *dislike*. Table (75) shows the distribution of students' percentages by the categories of this variable and their achievement in science. Jordan's percentages for the three categories were

as follows: 11%, 42% & 47% respectively. The Jordanian students' performance averages were as follows: 485, 430 & 420 respectively. These averages were higher than the Arab averages but less than the international averages.

Table (75)
Student's inclination to Science and achievement in science

| No. | Country | *Like | | Like to some extent | | Dislike | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | Tunisia | 56 | 450 | 37 | 426 | 8 | 422 |
| 2. | Jordan | 47 | 485 | 42 | 430 | 11 | 420 |
| 3. | Oman | 45 | 474 | 45 | 387 | 10 | 361 |
| 4. | Saudi Arabia | 45 | 460 | 37 | 421 | 18 | 413 |
| 5. | UAE | 43 | 496 | 40 | 447 | 17 | 433 |
| 6. | Palestine | 38 | 459 | 46 | 405 | 16 | 385 |
| 7. | Qatar | 36 | 479 | 44 | 393 | 19 | 373 |
| 8. | Bahrain | 32 | 493 | 45 | 445 | 23 | 422 |
| | Dubai/UAE | 49 | 511 | 37 | 468 | 14 | 446 |
| | Abu Dubai/UAE | 40 | 494 | 41 | 443 | 19 | 436 |
| Arab Average | | 43 | 475 | 42 | 419 | 15 | 404 |
| International Average | | 35 | 515 | 44 | 472 | 21 | 450 |

Table (76) shows the distribution of students' percentages by the categories of students' attitude towards Math and achievement in Math. Jordan's percentages at the three categories were as follows: 42%, 39% & 19% respectively, and Jordan's performance averages in Math by these categories were as follows: 422, 388 & 376 respectively. These averages were below the Arab and international averages and the relationship between the achievement in science or math and the students' attitude towards subject is positive at the Jordanian, Arab, and international levels.

* See the definitions of the measurement categories in appendix (5)

Table (76)
Student's inclination to Math and achievement in Math

| No. | Country | *Like | | Like to some extent | | Dislike | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | Morocco | 48 | 398 | 40 | 353 | 12 | 340 |
| 2. | Jordan | 42 | 442 | 39 | 388 | 19 | 376 |
| 3. | Oman | 38 | 420 | 45 | 342 | 17 | 324 |
| 4. | Tunisia | 38 | 448 | 40 | 415 | 23 | 405 |
| 5. | Syria | 37 | 408 | 44 | 373 | 19 | 353 |
| 6. | Lebanon | 35 | 475 | 43 | 441 | 21 | 425 |
| 7. | UAE | 31 | 488 | 42 | 448 | 27 | 432 |
| 8. | Palestine | 31 | 447 | 43 | 394 | 26 | 375 |
| 9. | Saudi Arabia | 29 | 436 | 40 | 389 | 32 | 364 |
| 10. | Qatar | 27 | 456 | 43 | 401 | 31 | 386 |
| 11. | Bahrain | 24 | 454 | 38 | 413 | 38 | 381 |
| | Abu Dubai/UAE | 32 | 485 | 42 | 441 | 26 | 420 |
| | Dubai/UAE | 29 | 508 | 41 | 473 | 30 | 456 |
| Arab Average | | 35 | 443 | 42 | 396 | 24 | 378 |
| International Average | | 26 | 504 | 42 | 467 | 31 | 443 |

- **Educational Resources at Home**

According to this variable, students were distributed into three categories, **many "resources"**, **"some resources"**, and **"few resources"**. Table (77) shows the distribution of students' percentage according to the categories of this variable and achievement in science. were percentages of Jordan on the three categories came with the same order as follows: 6%, 67% & 27%, while at the Arab level percentages were 7%, 63% & 31%, and at the international level they were: 12%, 67% & 21%. The Jordanian students' performance averages in science by these categories were as follows: 488, 461 & 421, and on the Arab level averages were: 481, 437 & 395 while on the international level they were: 540, 480 & 422.

Table No. (77)
Educational Resources availability at Home and Achievement in Science

| No. | Country | *Many resources | | Some resources | | Few resources | |
|------------------------------|----------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | Qatar | 17 | 472 | 74 | 419 | 10 | 329 |
| 2. | UAE | 11 | 518 | 76 | 465 | 12 | 416 |
| 3. | Bahrain | 9 | 514 | 78 | 456 | 14 | 405 |
| 4. | Saudi Arabia | 6 | 472 | 61 | 445 | 32 | 414 |
| 5. | Jordan | 6 | 488 | 67 | 461 | 27 | 421 |
| 6. | Lebanon | 6 | 472 | 64 | 418 | 30 | 370 |
| 7. | Oman | 5 | 489 | 57 | 440 | 38 | 388 |
| 8. | Palestine | 4 | 474 | 63 | 433 | 33 | 391 |
| 9. | Tunisia | 3 | 494 | 58 | 446 | 38 | 423 |
| 10. | Syria | 3 | 448 | 52 | 433 | 45 | 419 |
| 11. | Morocco | 3 | 448 | 38 | 391 | 59 | 366 |
| | Dubai/UAE | 15 | 546 | 76 | 482 | 9 | 415 |
| | Abu Dubai/UAE | 11 | 508 | 76 | 463 | 13 | 416 |
| Arab Average | | 7 | 481 | 63 | 437 | 31 | 395 |
| International Average | | 12 | 540 | 67 | 480 | 21 | 424 |

Table (78) shows the distribution of students' percentage by the educational resources variable and achievement in math. Jordanian students' percentages were distributed on these three categories as follows: 6%, 61% & 32% respectively. At the Arab level, they were as follows: 7%, 63%, 32% respectively, and at the international level they were: 12%, 67%, 21% respectively. Jordanian students' performance averages in Math by the three categories were as follows: 447, 419 & 372, while on the Arab states these averages were as follows: 460, 416 & 374, while at the international they were as follows: 530, 470 & 415 all of which were higher than the Arab and Jordanian averages. This table indicates that the relationship between achievement in science or Math and the availability of educational resources at student's home is a positive relationship on the three levels.

* See the definitions of the measurement categories in appendix (5)

Table No. (78)
Educational Resources availability at Home and Achievement in Mathematic

| No. | Country | *Many resources | | Some resources | | Few resources | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | Qatar | 17 | 463 | 74 | 409 | 10 | 330 |
| 2. | UAE | 11 | 501 | 76 | 457 | 12 | 414 |
| 3. | Bahrain | 9 | 476 | 78 | 412 | 14 | 365 |
| 4. | Saudi Arabia | 6 | 428 | 61 | 403 | 32 | 370 |
| 5. | Jordan | 6 | 447 | 67 | 419 | 27 | 372 |
| 6. | Lebanon | 6 | 502 | 64 | 459 | 30 | 420 |
| 7. | Oman | 5 | 436 | 57 | 386 | 38 | 332 |
| 8. | Palestine | 4 | 452 | 63 | 416 | 33 | 378 |
| 9. | Tunisia | 3 | 493 | 58 | 436 | 38 | 403 |
| 10. | Syria | 3 | 408 | 52 | 387 | 45 | 371 |
| 11. | Morocco | 3 | 455 | 38 | 392 | 59 | 357 |
| | Dubai/UAE | 15 | 529 | 76 | 475 | 9 | 417 |
| | Abu Dubai/UAE | 11 | 489 | 76 | 451 | 13 | 408 |
| Arab Average | | 7 | 460 | 63 | 416 | 31 | 374 |
| International Average | | 12 | 530 | 67 | 470 | 21 | 415 |

- **Students' lack of previous knowledge and skills necessary to acquire new ones**

According to this variable, students were distributed into three categories: "***Do not lack previous knowledge***", "***lack previous knowledge to some extent***" "***Lack previous knowledge to great extent***". Table (79) shows the distribution of students' percentages according to the categories of this variable and achievement in Science, as Jordan's percentages on the three categories were as follows: 6%, 55% & 39% respectively, while at the Arab level these percentages were: 14%, 60% and 27% respectively, and on the international level they were: 20%, 61% & 19% respectively. Jordanian students' performance averages in science by these categories were as follows: 448, 459 & 435 respectively, and on the Arab and international levels averages they were: (446, 430, 413) and (496, 478, 455) respectively.

* See the definitions of the measurement categories in appendix (5)

Table (79)
Students' Lack of Previous Knowledge and Skills Necessary for Acquiring New Learning Experiences and Achievement in Science

| No. | Country | <i>Never</i> | | <i>To some extent</i> | | <i>To great extent</i> | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | UAE | 23 | 479 | 64 | 459 | 13 | 447 |
| 2. | Lebanon | 18 | 421 | 65 | 408 | 17 | 379 |
| 3. | Qatar | 18 | 451 | 62 | 420 | 20 | 384 |
| 4. | Bahrain | 18 | 476 | 64 | 454 | 18 | 428 |
| 5. | Morocco | 13 | 397 | 41 | 382 | 46 | 367 |
| 6. | Saudi Arabia | 13 | 440 | 65 | 438 | 22 | 430 |
| 7. | Oman | 12 | 438 | 59 | 419 | 30 | 413 |
| 8. | Tunisia | 10 | 454 | 64 | 439 | 25 | 431 |
| 9. | Syria | 10 | 441 | 64 | 427 | 26 | 417 |
| 10. | Palestine | 9 | 465 | 52 | 423 | 39 | 407 |
| 11. | Jordan | 6 | 448 | 55 | 459 | 39 | 435 |
| | Dubai/UAE | 26 | 511 | 62 | 470 | 12 | 467 |
| | Abu Dubai/UAE | 20 | 478 | 64 | 461 | 15 | 438 |
| Arab Average | | 14 | 446 | 60 | 430 | 27 | 413 |
| International Average | | 20 | 496 | 61 | 478 | 19 | 455 |

Table (80) shows the distribution of students' percentages by the categories of this variable and achievement in Math. Jordan's percentages on the three categories of this variable were as follows: 6%, 48% & 46% respectively, while on the Arab level the percentages were: 11%, 54%, 35% respectively, and on the international level they were: 15%, 57%, 82% respectively. Jordanian students' performance averages in Math by these categories were as follows: 428, 413 & 395 respectively, and on the Arab level they were as follows: 392, 471, 443 respectively. At the international level the performance averages they were: 490, 414, 443 respectively, and all of which were higher than the similar Arab and Jordanian averages. The relationship between achievement in Math and the variable students' lack of previous knowledge and skills necessary for acquiring new ones at the Jordanian, Arab and international levels were negative relationship, while on Jordanian the level the relationship was curvilinear but not linear.

Table No. (80)
Students' Lack of Previous Knowledge and Skills Necessary for Acquiring New Learning Experiences and Achievement in Math

| No. | Country | <i>Never</i> | | <i>To some extent</i> | | <i>To great extent</i> | |
|-----------------------|---------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average |
| 1. | Lebanon | 28 | 461 | 57 | 446 | 15 | 440 |
| 2. | Qatar | 18 | 431 | 62 | 411 | 20 | 385 |
| 3. | UAE | 14 | 472 | 72 | 457 | 15 | 430 |
| 4. | Morocco | 11 | 399 | 38 | 385 | 51 | 355 |
| 5. | Saudi Arabia | 10 | 405 | 57 | 401 | 33 | 383 |
| 6. | Bahrain | 8 | 435 | 55 | 415 | 37 | 397 |
| 7. | Syria | 8 | 395 | 60 | 382 | 32 | 369 |
| 8. | Oman | 6 | 372 | 49 | 379 | 45 | 351 |
| 9. | Jordan | 6 | 428 | 48 | 413 | 46 | 395 |
| 10. | Tunisia | 5 | 419 | 54 | 431 | 40 | 417 |
| 11. | Palestine | 5 | 400 | 43 | 417 | 53 | 395 |
| 12 | Dubai/UAE | 19 | 503 | 66 | 476 | 15 | 445 |
| 13 | Abu Dubai/UAE | 10 | 466 | 75 | 452 | 15 | 427 |
| Arab Average | | 11 | 420 | 54 | 412 | 35 | 392 |
| International Average | | 15 | 490 | 57 | 471 | 28 | 443 |

- Students' Interruptions or Lack of Interest during Classes**

According to these two variables students were distributed into two categories: ("***few interruptions***", "***many interruptions***") and ("***Lack of interest to some extent***", "***Lack of interest to great extent***"). Table (81) shows the distribution of students' percentages by the categories of these variables on one hand, and the achievement in science on the other hand. Jordan's percentages on the categories of students' interruption variable and lack of interest variable were as follows : (70%, 30%) and (64%, 36%) respectively. On the Arab level, students' interruption variable and lack of interest variable were as follows: (78%, 22%) and (71%, 29%) respectively. on the international level, the percentages were as follows: (83%, 17%) and (79%, 21%) respectively. Jordanian students' performance averages in Science were as follows: (459, 425), (460. 429) respectively, and on the Arab level, they were (431, 415) and (435 409) respectively. On the international level, they were (481 462) for the students' interruption

variable categories. The Jordanian performance averages were as follows: (76%, 24%) for the students' interruption variable categories and (64%, 36%) for the lack of interest variable categories. On the Arab level, the percentages were as follows: (79%, 21%) for the students' interruption variable and (66% 34%) for the lack of interest variable. On the international level, the percentages were (83%, 17%) for the students' interruption variable and (76%, 24%) for the lack of students interest variable.

Table (81)
Limited Teaching because of Students' Interruption or Lack of Interest and Achievement in Science

| No. | Country | Student's Interruptions | | | | Lack of Interest | | | |
|-----------------------|---------------|-------------------------|---------------------|------------------------|---------------------|---------------------------------|---------------------|----------------------------------|---------------------|
| | | Few Interruptions | | Many Interruptions | | Lack of interest to some extent | | Lack of interest to great extent | |
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average |
| 1. | Bahrain | 79 | 459 | 21 | 433 | 73 | 465 | 27 | 423 |
| 2. | Jordan | 70 | 459 | 30 | 425 | 64 | 460 | 36 | 429 |
| 3. | Lebanon | 84 | 407 | 16 | 403 | 84 | 408 | 16 | 394 |
| 4. | Morocco | 73 | 376 | 27 | 377 | 53 | 384 | 47 | 368 |
| 5. | Oman | 82 | 424 | 18 | 398 | 62 | 431 | 38 | 401 |
| 6. | Palestine | 67 | 424 | 33 | 413 | 59 | 423 | 41 | 417 |
| 7. | Qatar | 85 | 426 | 15 | 372 | 79 | 430 | 21 | 375 |
| 8. | Saudi Arabia | 83 | 438 | 17 | 431 | 81 | 441 | 19 | 416 |
| 9. | Syria | 76 | 428 | 24 | 421 | 67 | 433 | 33 | 412 |
| 10. | Tunisia | 74 | 439 | 26 | 437 | 74 | 442 | 26 | 429 |
| 11. | UAE | 84 | 464 | 16 | 450 | 80 | 468 | 20 | 438 |
| | Abu Dubai/UAE | 79 | 466 | 21 | 443 | 74 | 466 | 26 | 446 |
| | Dubai/UAE | 85 | 488 | 15 | 441 | 84 | 490 | 16 | 431 |
| Arab Average | | 78 | 431 | 22 | 415 | 71 | 435 | 29 | 409 |
| International Average | | 83 | 481 | 17 | 462 | 79 | 482 | 21 | 456 |

Jordanian students' performance average in Math by the students' interruption variable categories were (406, 405) respectively, and (414.391) by the lack of interest variable categories. On the Arab level, the averages were as follows: (410, 390) and (414, 414) respectively. Whereas the international level the averages were as follows: (472, 444) and (475, 441) respectively. All these averages were higher than the similar Arab and international averages in math and science. Jordan's averages in science were higher than the Arab averages

while in Math these averages were relatively the same. The relationship between achievement in Math or Science and these two variables was negative on the Jordanian, Arab and international levels.

Table (82)
Limited Teaching because of Students Interruption or Lack of Interest and Achievement in Math

| No. | Country | Student's Interruptions | | | | Lack of Interest | | | |
|-----------------------|---------------|-------------------------|---------------------|------------------------|---------------------|---------------------------------|---------------------|----------------------------------|---------------------|
| | | No Few Interruptions | | or Many Interruptions | | Lack of interest to some extent | | Lack of interest to great extent | |
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average |
| 1. | Bahrain | 76 | 420 | 24 | 377 | 62 | 424 | 38 | 387 |
| 2. | Jordan | 76 | 406 | 24 | 405 | 64 | 414 | 36 | 391 |
| 3. | Lebanon | 90 | 449 | 10 | 453 | 85 | 451 | 15 | 445 |
| 4. | Morocco | 79 | 374 | 21 | 362 | 49 | 383 | 51 | 360 |
| 5. | Oman | 86 | 370 | 14 | 340 | 59 | 376 | 41 | 351 |
| 6. | Palestine | 61 | 406 | 39 | 402 | 55 | 403 | 45 | 406 |
| 7. | Qatar | 78 | 420 | 22 | 368 | 76 | 425 | 24 | 359 |
| 8. | Saudi Arabia | 82 | 401 | 18 | 370 | 74 | 400 | 26 | 383 |
| 9. | Syria | 73 | 384 | 27 | 361 | 61 | 388 | 39 | 363 |
| 10. | Tunisia | 75 | 425 | 25 | 425 | 59 | 429 | 41 | 419 |
| 11. | UAE | 90 | 459 | 10 | 424 | 85 | 461 | 15 | 423 |
| | Abu Dubai/UAE | 89 | 452 | 11 | 428 | 82 | 453 | 18 | 435 |
| | Dubai/UAE | 93 | 481 | 7 | 424 | 92 | 482 | 8 | 417 |
| Arab Average | | 79 | 410 | 21 | 390 | 66 | 414 | 34 | 390 |
| International Average | | 83 | 472 | 17 | 444 | 76 | 475 | 24 | 441 |

- Students' Suffering from Lack of Nutrition or Lack of Sleep**

Students were distributed by the lack of nutrition variable into two categories: ("*Don't suffer from lack of nutrition*") and ("*Suffer from lack of nutrition at a moderate or high level*"). Both categories were titled in table (83) and in table (84) with "*never*", "*some or much*". Regarding the Lack of Sleep variable, they were distributed into two categories: ("*Do not suffer from lack of Sleep*") and "*Suffer from lack of Sleep at a moderate or high level*".

Table (83) shows the distribution of students' percentages by the categories of the students' suffering from lack of nutrition or lack of sleep variables and the achievement in science. Jordan's percentages were as follows: (30%, 70%), (42%, 58%) respectively. On the Arab level

the percentages were as follows: (45%, 55%) and (37%, 63%), and on the international level they were as follows: (64%, 36%) and (42%, 58) respectively.

Jordanian students' performance averages in science according to the categories of these variables were as follows: (451,448) and (451, 448) respectively while on the Arab and international levels these averages were: (436, 421), (424, 435), (485, 461) and (484, 473) respectively.

Table (83)

Limited Teaching in Science because of Students' Suffering from Lack of Nutrition or Lack of Sleep

| No. | Country | Nutrition | | | | Sleep | | | |
|-----------------------|---------------|--|---------------------|--------------------------------------|---------------------|---|---------------------|----------------------------------|---------------------|
| | | <i>Don't suffer from lack of nutrition</i> | | <i>Suffer from lack of nutrition</i> | | <i>Do not suffer from lack of Sleep</i> | | <i>Suffer from lack of Sleep</i> | |
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average |
| 1. | Bahrain | 53 | 469 | 47 | 436 | 31 | 473 | 69 | 445 |
| 2. | Jordan | 30 | 451 | 70 | 448 | 42 | 451 | 58 | 448 |
| 3. | Lebanon | 65 | 402 | 35 | 413 | 36 | 402 | 64 | 407 |
| 4. | Morocco | 30 | 394 | 70 | 370 | 38 | 379 | 62 | 375 |
| 5. | Oman | 38 | 424 | 62 | 417 | 47 | 424 | 53 | 416 |
| 6. | Palestine | 24 | 436 | 76 | 416 | 27 | 415 | 73 | 423 |
| 7. | Qatar | 52 | 439 | 48 | 395 | 34 | 452 | 66 | 401 |
| 8. | Saudi Arabia | 39 | 436 | 61 | 437 | 23 | 439 | 77 | 436 |
| 9. | Syria | 44 | 428 | 56 | 425 | 48 | 429 | 52 | 424 |
| 10. | Tunisia | 56 | 446 | 44 | 429 | 44 | 439 | 56 | 439 |
| 11. | UAE | 61 | 475 | 39 | 442 | 40 | 477 | 60 | 452 |
| | Abu Dubai/UAE | 60 | 469 | 40 | 452 | 39 | 469 | 61 | 456 |
| | Dubai/UAE | 64 | 506 | 36 | 434 | 47 | 503 | 53 | 461 |
| Arab Average | | 45 | 436 | 55 | 421 | 37 | 435 | 63 | 424 |
| International Average | | 64 | 485 | 36 | 461 | 42 | 484 | 58 | 473 |

Table (84) shows the percentage of students by the categories' variables of lack of nutrition and lack of sleep and by the achievement in Math. Jordan's percentages of the two variables were as follows: (27%, 73%) and (40%, 60%) respectively. At the Arab level, these percentages were as follows: (43%, 57%) and (40%, 60%) respectively. At the international level these variable were: (63%, 37%), (43%, 57%) respectively. The performance averages of Jordanian students' in Math by the categories of these two variables were as follows: (417,402) and (409, 404) respectively. At the Arab level the averages were as follows: (420, 396) and (415, 400)

respectively. At the international level, they were as follows: (477, 449) and (477, 461) respectively. The international averages were higher than the similar Jordanian and Arab averages. In addition, international averages in science were the highest, and the Jordanian averages were higher than the Arab averages in science but these averages were nearly the same in Math.

It is worth mentioning that there is negative relationship between the lack of nutrition and the lack of Sleep variables on one hand and students' achievement on the other hand in Math and science at the Jordanian, the Arab and the international levels.

Table (84)

Limited Teaching in Math because of Students' Suffering from Lack of Nutrition or Lack of Sleep

| No. | Country | Nutrition | | | | Sleep | | | |
|-----------------------|---------------|-------------------------------------|---------------------|-------------------------------|---------------------|----------------------------------|---------------------|---------------------------|---------------------|
| | | Don't suffer from lack of nutrition | | Suffer from lack of nutrition | | Do not suffer from lack of Sleep | | Suffer from lack of Sleep | |
| | | Students' Percentage % | Performance Average | % Students' Percentage | Performance Average | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average |
| 1. | Bahrain | 47 | 437 | 53 | 386 | 33 | 439 | 67 | 396 |
| 2. | Jordan | 27 | 417 | 73 | 402 | 40 | 409 | 60 | 404 |
| 3. | Lebanon | 66 | 450 | 34 | 446 | 53 | 453 | 47 | 446 |
| 4. | Morocco | 32 | 392 | 68 | 361 | 37 | 376 | 63 | 369 |
| 5. | Oman | 36 | 382 | 64 | 357 | 56 | 375 | 44 | 354 |
| 6. | Palestine | 19 | 422 | 81 | 400 | 18 | 408 | 82 | 403 |
| 7. | Qatar | 56 | 431 | 44 | 382 | 39 | 426 | 61 | 398 |
| 8. | Saudi Arabia | 37 | 403 | 63 | 391 | 28 | 400 | 72 | 393 |
| 9. | Syria | 48 | 381 | 52 | 377 | 48 | 385 | 52 | 373 |
| 10. | Tunisia | 51 | 437 | 49 | 412 | 46 | 425 | 54 | 425 |
| 11. | UAE | 50 | 472 | 50 | 439 | 38 | 474 | 62 | 444 |
| | Abu Dubai/UAE | 43 | 465 | 57 | 439 | 31 | 466 | 69 | 444 |
| | Dubai/UAE | 63 | 498 | 37 | 440 | 51 | 494 | 49 | 458 |
| Arab Average | | 43 | 420 | 57 | 396 | 40 | 415 | 60 | 400 |
| International Average | | 63 | 477 | 37 | 449 | 43 | 477 | 57 | 461 |

Selected characteristics of teachers

- Teachers' qualifications**

Table (85) shows the science teachers' qualifications in the Arab countries who participated in the study and averages of these qualifications' at the Arab and international levels. In Jordan, the percentage of students who receive education on science from teachers holding Master's degree or a higher degree was 12%, and the percentage of students who receive education on science from teachers holding the Bachelor's degree was 83%. In addition, 4% of students receive education on science from teachers holding diploma from community colleges, and 1% of students are being educated by science teachers who hold only the high school or secondary

certificate. At the Arab level, the percentages were: 13% for the Master's degree or higher, 75% for the Bachelor's degree, 6% for the Community College Diploma and 6% for High School (General Secondary Certificate). At the international level the percentages were: 27%, 63%, 8% and 2% respectively.

Table (85)
Science Teachers' Qualifications

| No. | Country | Master Degree and higher degrees | Bachelor degree | Diploma | General Secondary Certificate |
|------------------------------|---------------|----------------------------------|-----------------|----------|-------------------------------|
| 1. | Bahrain | 27 | 71 | 2 | 0 |
| 2. | Jordan | 12 | 83 | 4 | 1 |
| 3. | Lebanon | 9 | 83 | 6 | 2 |
| 4. | Morocco | 4 | 39 | 0 | 57 |
| 5. | Oman | 7 | 93 | 0 | 0 |
| 6. | Palestine | 11 | 83 | 6 | 0 |
| 7. | Qatar | 35 | 61 | 0 | 3 |
| 8. | Saudi Arabia | 3 | 94 | 3 | 0 |
| 9. | Syria | 1 | 65 | 32 | 2 |
| 10. | Tunisia | 1 | 83 | 16 | 0 |
| 11. | UAE | 28 | 71 | 1 | 0 |
| | Abu Dubai/UAE | 20 | 79 | 1 | 0 |
| | Dubai/UAE | 41 | 58 | 1 | 0 |
| Arab Average | | 13 | 75 | 6 | 6 |
| International Average | | 27 | 63 | 8 | 2 |

Table (86) shows the math teachers' qualifications in the participating Arab countries and the averages of these qualifications' at the Arab and international levels. In Jordan, the percentage of students who receive education in math from teachers who hold the Master's degree or a higher degree was 12%, and the percentage of students who receive education in math from teachers who hold the Bachelor's degree was 75%. Also, 12% of students receive education in math from teachers holding a community colleges diploma, and 1% of students are being educated by Math teachers who hold only the high school or secondary certificate. At the Arab level the percentages were: 11%, 70%, 11% and 8% respectively. At the international level the percentages were: 24%, 63%, 11% and 3% respectively.

Table (86)
Math Teachers' Qualifications

| No. | Country | Master and degrees | Degree higher | Bachelor degree | Diploma | General Secondary Certificate |
|------------------------------|---------------|--------------------|---------------|-----------------|-----------|-------------------------------|
| 1. | Bahrain | 23 | | 74 | 2 | 2 |
| 2. | Jordan | 12 | | 75 | 12 | 1 |
| 3. | Lebanon | 4 | | 72 | 18 | 7 |
| 4. | Morocco | 1 | | 19 | 0 | 80 |
| 5. | Oman | 5 | | 95 | 0 | 0 |
| 6. | Palestine | 4 | | 85 | 11 | 0 |
| 7. | Qatar | 29 | | 68 | 2 | 0 |
| 8. | Saudi Arabia | 1 | | 95 | 4 | 0 |
| 9. | Syria | 13 | | 45 | 41 | 1 |
| 10. | Tunisia | 1 | | 73 | 25 | 1 |
| 11. | UAE | 26 | | 70 | 4 | 0 |
| | Abu Dubai/UAE | 21 | | 74 | 5 | 0 |
| | Dubai/UAE | 36 | | 58 | 5 | 0 |
| Arab Average | | 11 | | 70 | 11 | 8 |
| International Average | | 24 | | 63 | 11 | 3 |

- **Teacher's Main specialization**

Table (87) shows the Science teachers' main specialization as well as the averages of percentages at the Arab and the international levels by the teacher's major specialization. The percentage of Jordanian students who receive education on science from teachers whose major specialization was science in addition to a higher education Diploma was 8%, and the performance average of the students' was 445. The percentage of students who receive education on science from teachers whose major specialization was science and hold Community College Diploma was 19% and the average of their achievement was 446. Percentage of students who receive education on science from teachers whose major specialization was only Science was 69% and the average of their achievement was 448. 3% of students receive education on science from teachers majoring in other different specialties and their achievement was 473. 1% of students learn Science by teachers who hold only the high school or secondary certificate.

At the Arab level, the percentages were: 21%, 8%, 63%, 2% and 6% respectively and students' performance averages were: 434,438,426,421 and 423 respectively. At the international level,

the percentages were: 28%, 11%, 51%, 8% and 2% respectively. Matching performance averages (excluding the last average) were: 480,470,478 and 476. The performance averages reveal that at the international level, the best and ideal major for science teachers was science specialization, in addition to Education. However, this did not appear at the Jordanian and Arab levels.

Table (87)
Major Specialization of Science Teachers

| No. | Country | Science + Education | | Science + Community College Diploma | | Science only | | Other majors | | Second Secondary certificate | |
|-----------------------|---------------|------------------------|---------------------|-------------------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------------|---------------------|
| | | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average |
| 1. | Bahrain | 36 | 465 | 9 | 461 | 52 | 443 | 2 | ~ | 0 | ~ |
| 2. | Jordan | 8 | 445 | 19 | 446 | 69 | 448 | 3 | 473 | 1 | ~ |
| 3. | Lebanon | 32 | 415 | 4 | 408 | 59 | 403 | 4 | 392 | 2 | ~ |
| 4. | Morocco | 7 | 374 | 0 | ~ | 37 | 376 | 0 | ~ | 56 | 377 |
| 5. | Oman | 36 | 424 | 3 | 472 | 60 | 417 | 0 | ~ | 0 | ~ |
| 6. | Palestine | 11 | 427 | 20 | 403 | 65 | 429 | 4 | 399 | 0 | ~ |
| 7. | Qatar | 25 | 438 | 3 | 421 | 67 | 414 | 2 | ~ | 3 | 468 |
| 8. | Saudi Arabia | 27 | 443 | 11 | 462 | 61 | 428 | 1 | ~ | 0 | ~ |
| 9. | Syria | 16 | 423 | 3 | 431 | 73 | 425 | 5 | 419 | 2 | ~ |
| 10. | Tunisia | 9 | 439 | 0 | ~ | 90 | 437 | 2 | ~ | 0 | ~ |
| 11. | UAE | 24 | 477 | 12 | 437 | 62 | 461 | 2 | ~ | 0 | ~ |
| | Abu Dubai/UAE | 22 | 464 | 13 | 435 | 63 | 463 | 3 | 467 | 0 | ~ |
| | Dubai/UAE | 34 | 507 | 7 | 413 | 54 | 475 | 5 | 443 | 0 | ~ |
| Arab Average | | 21 | 434 | 8 | 438 | 63 | 426 | 2 | 421 | 6 | 423 |
| International Average | | 28 | 480 | 11 | 470 | 51 | 478 | 8 | 476 | 2 | ~ |

Table (88) shows the Math teachers' major specialization as well as the averages of percentages at the Arab and the international levels by the teachers' major specialization. The percentage of Jordanian students who receive education on math from teachers whose major specialization was Math in addition to a higher education Diploma was 9% and the performance average of these students was 424. The percentage of students who receive education on math from teachers whose major specialization was Math and hold a community college Diploma was 9% and the performance average of the students was 407. The percentage of students who receive education on math from teachers whose major specialization was only math was 80% and the performance average of the students was 404. The percentages of students who receive

education on math from teachers majoring in other different specialties and 1% of students receive education on math by teachers who hold only general secondary certificate. At the Arab level, the percentages were as follows: 25%, 13%, 50%, 4% and 8% respectively and students' performance averages were as follows: 411,402,406,418 and 406 respectively. At the international level, the percentages were as follows: 32%, 12%, 41%, 12% and 3% respectively and the students' performance averages were: 471, 470, 468, 462 and 418. The performance averages indicate that the Jordanian and Arab levels were below the international level. The math percentages indicate the importance of the educational qualification besides the major specialization, as students who receive their education on math from teachers whose major specializations are math and education diploma are better with statistical significance than students who receive their education on math from teachers whose major specialization is math only.

Regarding science, the situation was not that clear as the averages of students' performance do not vary according to their teachers' majors or specialties. This indicates that there is weakness in the provision of teachers' qualification programs for science teachers.

Table (88)
Major Specialization of Math Teachers

| No. | Country | Math + Education | | Math + Community Diploma | | Math only | | Other majors | | Second Secondary certificate | |
|-----------------------|---------------|------------------------|---------------------|--------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------------|---------------------|
| | | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average | Students' Percentage % | Performance Average |
| 1. | Bahrain | 18 | 458 | 30 | 389 | 48 | 404 | 2 | ~ | 2 | ~ |
| 2. | Jordan | 9 | 424 | 9 | 407 | 80 | 404 | 2 | ~ | 1 | ~ |
| 3. | Lebanon | 43 | 448 | 2 | ~ | 37 | 452 | 11 | 454 | 7 | 439 |
| 4. | Morocco | 5 | 373 | 0 | ~ | 12 | 360 | 3 | 365 | 80 | 373 |
| 5. | Oman | 48 | 363 | 12 | 366 | 39 | 370 | 1 | ~ | 0 | ~ |
| 6. | Palestine | 17 | 399 | 24 | 394 | 52 | 409 | 7 | 421 | 0 | ~ |
| 7. | Qatar | 35 | 387 | 13 | 414 | 46 | 422 | 6 | 431 | 0 | ~ |
| 8. | Saudi Arabia | 31 | 399 | 38 | 397 | 30 | 394 | 2 | ~ | 0 | ~ |
| 9. | Syria | 17 | 379 | 2 | ~ | 71 | 380 | 8 | 361 | 1 | ~ |
| 10. | Tunisia | 17 | 428 | 1 | ~ | 78 | 422 | 3 | 433 | 1 | ~ |
| 11. | UAE | 37 | 467 | 7 | 449 | 53 | 448 | 3 | 464 | 0 | ~ |
| | Abu Dubai/UAE | 32 | 455 | 9 | 451 | 57 | 448 | 2 | ~ | 0 | ~ |
| | Dubai/UAE | 48 | 490 | 3 | 449 | 47 | 463 | 3 | 494 | 0 | ~ |
| Arab Average | | 25 | 411 | 13 | 402 | 50 | 406 | 4 | 418 | 8 | 406 |
| International Average | | 32 | 471 | 12 | 470 | 41 | 468 | 12 | 462 | 3 | 418 |

- **Teacher's Years of Experience**

Table (89) shows the categories for science teacher's years of experience, as well as the averages of those years for the teachers in the participating Arab countries and the international average of science teacher's years of experience.

The percentage of Jordanian students taught by teachers having 20 years of experience or above was 7%, while the percentage of Jordanian students who received education from teachers with 10 years of experience or less than 20 years was 22%. However, the percentage of those taught by teachers with 5 years of experience or less than 10 was 33%, but the percentage was 38% for Jordanian students taught by science teachers with years of experience less than 5. It is worth noting that the average of years of experience for science teachers in Jordan is mainly 8 years. The performance averages in science for Jordanian students taught by teachers by the years of experience, as mentioned before, were 453, 469, 449, 436. This indicates that the highest performance average for Jordanian students refers to the students taught by teachers having 10 years of experience and less than 20.

With reference to the Arab countries, the percentages were as follows: 19%, 34%, 25%, 22% respectively, while the performance averages of Arab students were 431, 433, 428, 419 respectively. At the international level, the performance averages of students were 480, 480, 475, 471 respectively. It should be noted that the years of experience average for the Jordanian science teachers is less than that of science teachers in the Arab countries, and the years of experience averages for the Jordanian teachers and for the Arabs teachers are lower than that of the International average.

Table 89
Years of Experience for Science Teachers

| Country | 20 years and above | | 10 years and less than 20 | | 5 years and less than 10 | | Less than 5 years | | Years of Experience Average |
|-------------------------|-----------------------|---------------------|---------------------------|---------------------|--------------------------|---------------------|-----------------------|---------------------|-----------------------------|
| | Students percentage % | Performance Average | Students percentage % | Performance Average | Students percentage % | Performance Average | Students percentage % | Performance Average | |
| 1 Bahrain | 27 | 461 | 47 | 436 | 18 | 479 | 7 | 473 | 15 |
| 2 Jordan | 7 | 453 | 22 | 469 | 33 | 449 | 38 | 436 | 8 |
| 3 Lebanon | 18 | 418 | 26 | 420 | 29 | 390 | 27 | 405 | 11 |
| 4 Morocco | 53 | 378 | 28 | 377 | 9 | 378 | 11 | 370 | 19 |
| 5 Oman | 5 | 416 | 26 | 432 | 34 | 416 | 36 | 419 | 7 |
| 6 Palestine | 14 | 413 | 40 | 437 | 26 | 427 | 20 | 384 | 11 |
| 7 Qatar | 17 | 422 | 31 | 427 | 32 | 417 | 20 | 397 | 11 |
| 8 Saudi Arabia | 9 | 446 | 53 | 443 | 20 | 427 | 19 | 424 | 12 |
| 9 Syria | 13 | 431 | 21 | 428 | 23 | 437 | 43 | 421 | 9 |
| 10 Tunisia | 30 | 453 | 38 | 437 | 28 | 425 | 3 | 415 | 15 |
| 11 United Arab Emirates | 17 | 451 | 42 | 462 | 24 | 467 | 17 | 465 | 12 |
| Abu Dhabi /UAE | 21 | 447 | 42 | 464 | 27 | 459 | 10 | 465 | 13 |
| Dubai /UAE | 13 | 481 | 39 | 489 | 27 | 477 | 21 | 472 | 11 |

| | | | | | | | | | |
|-----------------------|----|-----|----|-----|----|-----|----|-----|----|
| Arab average | 19 | 431 | 34 | 433 | 25 | 428 | 22 | 419 | |
| International average | 33 | 480 | 29 | 480 | 19 | 475 | 20 | 471 | 15 |

Table (90) shows the categories of the math teacher's years of experience and shows the averages of those years for teachers of the participating Arab countries. The percentage of Jordanian students taught by teachers of math having 20 years of experience or above was 16% while students who received education from teachers with 10 years of experience or less than 20 years was 29%. However, the percentage of students taught by teachers with 5 years of experience or less than 10 was 29%, while the percentage of Jordanian students taught by math teachers with years of experience less than 5 was 26%.

It is worth noting that the years of experience average for math teachers in Jordan is 11 years. The Performance averages in Math for Jordanian students by teachers years of experience were 406 ,410 ,394 ,413 respectively. It is obvious that the highest average in performance refers to students taught by teachers having less than 5 years of experience.

With reference to the Arab countries, the percentages were as follows: 24%, 33%, 24%, 19% while the performance averages in math were 413 ,410 ,401, 400 respectively, and at the international level the percentages were as 36%, 28%, 19%, 18% and the performance averages were 458, 463, 470 ,474 respectively. It should be noted that the years of experience average for math teachers in Jordan is less than that of the Arab countries as well as that of the international level. It is apparent that there is a positive relation between the variables of the years of experience in teaching math and students' achievement at both the Arab level and the international level while this relation did not appear at the Jordanian level.

Table(90)
Years of Experience for Math Teachers

| Country | 20 years and above | | 10 years and less than 20 | | 5 years and less than 10 | | Less than 5 years | | Years of Experience Average |
|---------------------------|-----------------------|---------------------|---------------------------|---------------------|--------------------------|---------------------|-----------------------|---------------------|-----------------------------|
| | Students percentage % | Performance Average | Students percentage % | Performance Average | Students percentage % | Performance Average | Students percentage % | Performance Average | |
| 1 Bahrain | 19 | 433 | 54 | 404 | 17 | 403 | 10 | 430 | 14 |
| 2 Jordan | 16 | 406 | 29 | 410 | 29 | 394 | 26 | 413 | 11 |
| 3 Lebanon | 27 | 454 | 32 | 445 | 21 | 460 | 20 | 445 | 14 |
| 4 Morocco | 69 | 374 | 11 | 373 | 5 | 358 | 15 | 363 | 22 |
| 5 Oman | 7 | 362 | 25 | 385 | 46 | 363 | 21 | 360 | 9 |
| 6 Palestine | 14 | 413 | 37 | 410 | 24 | 400 | 25 | 394 | 11 |
| 7 Qatar | 23 | 432 | 36 | 425 | 25 | 388 | 16 | 386 | 13 |
| 8 Saudi Arabia | 13 | 386 | 41 | 406 | 25 | 402 | 21 | 367 | 11 |
| 9 Syria | 16 | 400 | 26 | 375 | 24 | 370 | 35 | 378 | 10 |
| 10 Tunisia | 38 | 442 | 35 | 419 | 18 | 417 | 10 | 394 | 16 |
| 11 United Arab | 24 | 442 | 36 | 455 | 26 | 461 | 14 | 467 | 13 |
| Abu Dhabi | 25 | 456 | 30 | 433 | 29 | 456 | 16 | 463 | 14 |
| Dubai /UAE | 19 | 443 | 42 | 491 | 25 | 488 | 13 | 471 | 13 |
| average for Arab States | 24 | 413 | 33 | 410 | 24 | 401 | 19 | 400 | 13 |
| average for International | 36 | 474 | 28 | 470 | 19 | 463 | 18 | 458 | 16 |

- Teacher's Teaching Ability**

Table (91) shows the distribution of students' percentages by their teachers confidence in their ability to teach science as they are divided into two main categories: (highly confident and slightly confident). The percentage of students taught by science teachers having high confidence in their ability to teach this subject was 63%, and was 37% for students taught by science teachers having slight confidence. The performance average for Jordanian students in science by the variable of the science teachers' confidence in teaching science was (451,446) respectively. Regarding the Arab level , the percentages were (74%, 26%) respectively and the performance averages were 430,418 respectively. At the international level, the percentages were (73%, 27%) respectively and the performance average were 479,467 respectively.

Table (91)
Science Teachers' Confidence in their Ability to Teach Science

| Country | | *Highly Confident | | Slightly Confident | |
|---------|----------------------------------|-----------------------|---------------------|-----------------------|---------------------|
| | | Students percentage % | Performance Average | Students percentage % | Performance Average |
| 1 | United Arab Emirates | 87 | 464 | 13 | 449 |
| 2 | Qatar | 86 | 426 | 14 | 372 |
| 3 | Lebanon | 83 | 411 | 17 | 378 |
| 4 | Oman | 83 | 420 | 17 | 417 |
| 5 | Saudi Arabia | 76 | 439 | 24 | 429 |
| 6 | Tunisia | 74 | 440 | 26 | 434 |
| 7 | Bahrain | 71 | 458 | 29 | 442 |
| 8 | Palestine | 68 | 421 | 32 | 419 |
| 9 | Syria | 65 | 421 | 35 | 435 |
| 10 | Jordan | 63 | 451 | 37 | 446 |
| 11 | Morocco | 60 | 379 | 40 | 372 |
| | Dubai /UAE | 92 | 487 | 8 | 405 |
| | Abu Dhabi /UAE | 86 | 462 | 14 | 458 |
| | average for Arab States | 74 | 430 | 26 | 418 |
| | average for International States | 73 | 479 | 27 | 467 |

Table (92) shows students' percentages by their teachers' confidence in their ability to teach math. The percentage of Jordanian students taught by math teachers having high confidence in their ability to teach math was 66% ,yet it was 34% for students who were taught by math teachers having slight confidence in their teaching ability. The performance averages for Jordanian students in math by the variable of the teachers' confidence to teach math (highly confident and slightly confident) were (401,408) respectively. Regarding the Arab level, the percentages were 73% and 27% respectively, and 76%, 24% at the international level respectively. The performance average were (390,411) at the Arab level respectively, and (456, 470) at the international level respectively. It is worth mentioning that there is a positive relation at the Jordanian, Arab and International levels between the level of teachers' confidence in their ability to teach both science and math and the students' achievement.

* See the definitions of the measurement categories in appendix (5)

Table (92)
Math Teachers' Confidence in their Ability to Teach Science

| Country | | *Highly Confident | | Slightly Confident | |
|---------|-----------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' percentage % | Performance average | Students' percentage % | Performance average |
| 1 | United Arab Emirates | 85 | 419 | 15 | 358 |
| 2 | Qatar | 81 | 463 | 19 | 423 |
| 3 | Lebanon | 81 | 370 | 19 | 349 |
| 4 | Oman | 80 | 455 | 20 | 433 |
| 5 | Saudi Arabia | 73 | 402 | 27 | 376 |
| 6 | Tunisia | 73 | 421 | 27 | 388 |
| 7 | Bahrain | 69 | 409 | 31 | 394 |
| 8 | Palestine | 67 | 380 | 33 | 376 |
| 9 | Syria | 66 | 375 | 34 | 365 |
| 10 | Jordan | 66 | 408 | 34 | 401 |
| 11 | Morocco | 61 | 422 | 39 | 428 |
| | Dubai /UAE | 86 | 486 | 14 | 414 |
| | Abu Dhabi /UAE | 77 | 458 | 23 | 422 |
| | Arab average | 73 | 411 | 27 | 390 |
| | International average | 76 | 470 | 24 | 456 |

- Teacher's Job Satisfaction**

This variable divides teachers into three categories: satisfied, fairly satisfied and dissatisfied by the level of teachers' satisfaction with their jobs as teachers.

Table (93) shows the distribution of students' percentages by the level of their science teachers satisfaction with their jobs and at the Arab and international levels as well. The percentage of Jordanian students taught by science teachers being satisfied with their jobs was 28%, and 51% of students were taught by teachers who are fairly satisfied, and was 21% for Jordanian students taught by teachers were dissatisfied with their jobs.

The performance averages for Jordanian students in science were (463, 451, 425) respectively. For the percentages at the Arab countries level, they were 48%,42%,10% respectively and their performance averages were (434,424,414) respectively. Regarding the international level, the percentages were 47%, 45%, 8% respectively and the performance averages were 481,474,473 respectively.

* See the definitions of the measurement categories in appendix (5)

Table(93)
Job Satisfaction for Science Teachers

| Country | | *Satisfied | | Fairly Satisfied | | Dissatisfied | |
|---------|-----------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|---------------------|
| | | Students percentage % | Performance Average | Students percentage % | Performance Average | Students percentage % | Performance Average |
| 1 | Syria | 62 | 426 | 35 | 427 | 4 | 414 |
| 2 | Qatar | 57 | 429 | 38 | 403 | 5 | 421 |
| 3 | Saudi Arabia | 56 | 442 | 39 | 427 | 6 | 442 |
| 4 | United Arab Emirates | 56 | 465 | 38 | 457 | 7 | 459 |
| 5 | Bahrain | 52 | 469 | 30 | 442 | 18 | 424 |
| 6 | Palestine | 50 | 423 | 41 | 418 | 9 | 417 |
| 7 | Tunisia | 49 | 438 | 46 | 441 | 5 | 420 |
| 8 | Lebanon | 43 | 416 | 50 | 405 | 7 | 350 |
| 9 | Morocco | 39 | 380 | 49 | 374 | 12 | 377 |
| 10 | Oman | 37 | 423 | 50 | 421 | 14 | 408 |
| 11 | Jordan | 28 | 463 | 51 | 451 | 21 | 425 |
| | Abu Dhabi /UAE | 61 | 460 | 33 | 456 | 7 | 485 |
| | Dubai /UAE | 58 | 487 | 36 | 476 | 6 | 419 |
| | Arab average | 48 | 434 | 42 | 424 | 10 | 414 |
| | International average | 47 | 481 | 45 | 474 | 8 | 473 |

Table (94) shows the distribution of students' percentages by the level of satisfaction for their Math teachers with their jobs. The percentage of Jordanian students taught by teachers being satisfied with their jobs was 31%, and 52% of students were taught by math teachers being fairly satisfied, and 81% of Jordanian students were taught by teachers dissatisfied with their jobs.

The Performance average for Jordanian students in math were (415,403, 399) respectively. At the Arab level, they were (46%, 46%, 8%) respectively, and the performance averages were (414, 400, 396) respectively. Regarding the international level, the percentages were (47%, 45%, 7%), and the performance averages were (473, 464, 462) respectively.

It is noted that there is a positive correlation between the teacher's level of satisfaction and students' performance at the Jordanian, Arab and International levels for science and math, noting that the Arab and Jordanian averages are lower than the similar international level.

* See the definitions of the measurement categories in appendix (5)

Table (94)
Job Satisfaction for Math Teachers

| Country | | *Satisfied | | Fairly Satisfied | | Dissatisfied | |
|---------|-----------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|---------------------|
| | | Students percentage % | Performance Average | Students Percentage % | Performance Average | Students Percentage % | Performance Average |
| 1 | Qatar | 66 | 421 | 31 | 387 | 3 | 395 |
| 2 | Syria | 62 | 382 | 35 | 370 | 3 | 402 |
| 3 | United Arab Emirates | 58 | 462 | 39 | 448 | 4 | 424 |
| 4 | Saudi Arabia | 54 | 401 | 37 | 394 | 9 | 363 |
| 5 | Tunisia | 48 | 426 | 47 | 423 | 5 | 432 |
| 6 | Palestine | 41 | 403 | 54 | 404 | 5 | 414 |
| 7 | Bahrain | 41 | 437 | 46 | 392 | 13 | 386 |
| 8 | Oman | 36 | 383 | 52 | 363 | 12 | 326 |
| 9 | Morocco | 36 | 381 | 49 | 365 | 15 | 368 |
| 10 | Lebanon | 34 | 448 | 61 | 453 | 6 | 427 |
| 11 | Jordan | 31 | 415 | 52 | 403 | 18 | 399 |
| | Dubai /UAE | 65 | 483 | 32 | 469 | 3 | 392 |
| | Abu Dhabi /UAE | 51 | 454 | 44 | 447 | 5 | 434 |
| | Arab average | 46 | 414 | 46 | 400 | 8 | 396 |
| | International average | 47 | 473 | 45 | 464 | 7 | 462 |

* See the definitions of the measurement categories in appendix (5)

• Teacher's Working Conditions

This study derived a variable to measure the teacher's working conditions. Based on that, three categories of students were realized. The first one refers to students taught by teachers who have no problems in their job environment, the second category represents students who were taught by teachers with slight job problems and the last group belonged to students taught by teachers with mild problems in their job environment. Table (95) shows the percentages of students according to teacher's job environment categories and students' performance averages in science.

The percentage of Jordanian students taught by teachers having no problems in their job environment was 17%, and 37% of students were taught by teachers having slight problems, and 46% for those were taught by teachers having problems in their jobs. Jordanian students' performance average related to this particular variable following the aforementioned sequence (**No Problems, Slight Problems, Mild Problems**) were (484, 453, 432 respectively. On the other

hand, the percentages for the same variable at the Arab level were 20%, 44%, 36% respectively and the similar performance averages were 448, 427, 420 respectively. Nevertheless, the percentages at the international level were 20%, 48%, 32% respectively, and the similar performance averages were 489, 477, 473 respectively.

Table (95)
Teacher Working Conditions and Achievement in Science

| Country | | *No Problems | | Slight Problems | | Mild Problems | |
|---------|-----------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|---------------------|
| | | Students Percentage % | Performance Average | Students percentage % | Performance Average | Students Percentage % | Performance Average |
| 1 | Qatar | 51 | 420 | 34 | 408 | 16 | 435 |
| 2 | Lebanon | 37 | 427 | 45 | 399 | 19 | 383 |
| 3 | United Arab Emirates | 36 | 467 | 44 | 457 | 19 | 460 |
| 4 | Bahrain | 25 | 495 | 37 | 451 | 38 | 427 |
| 5 | Saudi Arabia | 20 | 448 | 48 | 437 | 32 | 428 |
| 6 | Jordan | 17 | 484 | 37 | 453 | 46 | 432 |
| 7 | Palestine | 12 | 437 | 49 | 422 | 39 | 413 |
| 8 | Syria | 12 | 423 | 45 | 428 | 42 | 425 |
| 9 | Tunisia | 11 | 442 | 47 | 439 | 42 | 437 |
| 10 | Oman | 9 | 439 | 34 | 431 | 57 | 410 |
| 11 | Morocco | 7 | 443 | 25 | 374 | 68 | 371 |
| | Dubai /UAE | 45 | 501 | 43 | 464 | 12 | 450 |
| | Abu Dhabi /UAE | 29 | 463 | 52 | 456 | 19 | 467 |
| | Arab average | 22 | 448 | 40 | 427 | 38 | 420 |
| | International average | 20 | 489 | 48 | 477 | 32 | 473 |

* See the definitions of the measurement categories in appendix (5)

Table (96) shows the percentages of students according to the teacher's job environment variable and the students' performance averages in math.

The percentage of Jordanian students taught by teachers having no problems in their job environment was 14%, and 41% of students were taught by teachers having slight problems, and 45% for those taught by teachers having mild problems in their jobs. The performance averages for Jordanian students by this variable following the aforementioned sequence (No Problems, Slight Problems, Mild Problems) were 419,412,396 respectively.

On the other hand, the percentages for the same variable at the Arab level were 20%,44%,36% respectively, and their performance averages were 430, 405, 399 respectively. Nevertheless, the percentages at the international level were 21%, 49%, 31% and the equivalent performance averages were 476,467,464 respectively.

The students' performance averages in science and math at the Jordanian and Arab levels are lower than those at the international level. Moreover, there is a negative relation between students' performance and their teachers' problems in their job environment in math and science at the Jordanian, Arab and International levels.

Table (96)
Teacher's Working Conditions and Students' Achievement in Math

| Country | | *No Problems | | Slight Problems | | Mild Problems | |
|---------|-----------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|---------------------|
| | | Students Percentage % | Performance Average | Students Percentage % | Performance Average | Students Percentage % | Performance Average |
| 1 | Qatar | 47 | 410 | 41 | 408 | 11 | 409 |
| 2 | United Arab Emirates | 36 | 470 | 44 | 445 | 20 | 450 |
| 3 | Lebanon | 33 | 470 | 53 | 440 | 14 | 439 |
| 4 | Bahrain | 25 | 460 | 44 | 392 | 31 | 396 |
| 5 | Saudi Arabia | 14 | 419 | 41 | 412 | 45 | 396 |
| 6 | Jordan | 13 | 416 | 49 | 425 | 38 | 427 |
| 7 | Palestine | 13 | 430 | 51 | 391 | 36 | 388 |
| 8 | Syria | 13 | 366 | 41 | 389 | 47 | 374 |
| 9 | Tunisia | 10 | 399 | 51 | 413 | 39 | 394 |
| 10 | Oman | 9 | 396 | 38 | 372 | 53 | 356 |
| 11 | Morocco | 4 | 490 | 34 | 372 | 62 | 362 |
| | Dubai /UAE | 46 | 495 | 43 | 466 | 11 | 438 |
| | Abu Dhabi /UAE | 36 | 459 | 43 | 441 | 21 | 452 |
| | Arab average | 20 | 430 | 44 | 405 | 36 | 399 |
| | International average | 21 | 479 | 49 | 467 | 31 | 464 |

- **School Safety and System**

Table (97) shows the distribution of students' percentages by the school safety and system, as this variable was divided into three categories: safe and organized, fairly safe and organized and unsafe and disorganized. The percentage of Jordanian students by this variable were 36%, 53%, 11% respectively, and the performance average in science were 466, 446, 406 respectively. Regarding the Arab level, students' percentages were 45%, 48%, 6% respectively, and the similar performance averages were 441, 420, 385 respectively. Regarding the international level, the percentages were 45%, 50%, 6% respectively and their performance averages were 488, 470, 457 respectively.

* See the definitions of the measurement categories in appendix (5)

Table (97)
School Safety and System and Students
Achievement in Science from the Teacher's Perspective

| Country | | *Safe and Organized | | Slightly Safe and Organized | | Unsafe and Disorganized | |
|---------|-----------------------|-----------------------|---------------------|-----------------------------|---------------------|-------------------------|---------------------|
| | | Students percentage % | Performance Average | Students percentage % | Performance Average | Students percentage % | Performance Average |
| 1 | United Arab Emirates | 64 | 469 | 34 | 448 | 2 | ~ |
| 2 | Qatar | 63 | 430 | 35 | 398 | 2 | ~ |
| 3 | Syria | 60 | 428 | 37 | 424 | 3 | 425 |
| 4 | Lebanon | 49 | 426 | 46 | 393 | 5 | 338 |
| 5 | Saudi Arabia | 49 | 443 | 48 | 433 | 3 | 391 |
| 6 | Oman | 44 | 432 | 52 | 415 | 3 | 350 |
| 7 | Bahrain | 42 | 490 | 56 | 428 | 2 | ~ |
| 8 | Palestine | 37 | 423 | 57 | 422 | 5 | 370 |
| 9 | Jordan | 36 | 466 | 53 | 446 | 11 | 406 |
| 10 | Morocco | 31 | 392 | 54 | 371 | 15 | 367 |
| 11 | Tunisia | 22 | 447 | 59 | 437 | 18 | 435 |
| | Dubai /UAE | 75 | 495 | 24 | 431 | 1 | ~ |
| | Abu Dhabi /UAE | 57 | 464 | 40 | 456 | 3 | 442 |
| | Arab average | 45 | 441 | 48 | 420 | 6 | 385 |
| | International average | 45 | 488 | 50 | 470 | 6 | 457 |

Table (98) shows the distribution of students' percentages by school safety and system from the teacher's point of view and the students' performance averages in math. The percentage of Jordanian students by this variable were 36%, 59%, 5% respectively and the performance average in math were 418, 403, 355 respectively. At the Arab level, students' percentages were 45%, 48%, 7% respectively while their performance averages were 419, 402, 382 respectively. At the international level, the percentages were 45%, 49%, 6% and the performance averages were 479, 458, 445 respectively. The performance averages by the school safety and system at the Jordanian and the Arab levels were lower than those at the international level in both subjects. It is noted here that there is a positive relation between the school safety and system variable and the average performance in science and math at the Jordanian, Arab and international levels.

* See the definitions of the measurement categories in appendix (5)

Table (98)
School Safety and system and Students'
Achievement in Math from the Math Teacher's Perspective

| Country | | *Safe and Organized | | Fairly Safe and Organized | | Unsafe and Disorganized | |
|---------|-----------------------|-----------------------|---------------------|---------------------------|---------------------|-------------------------|---------------------|
| | | Students percentage % | Performance average | Students percentage % | Performance Average | Students Percentage % | Performance Average |
| 1 | Qatar | 68 | 421 | 29 | 384 | 3 | 396 |
| 2 | United Arab Emirates | 68 | 465 | 31 | 435 | 1 | ~ |
| 3 | Syria | 60 | 386 | 38 | 366 | 2 | ~ |
| 4 | Saudi Arabia | 51 | 405 | 46 | 386 | 2 | ~ |
| 5 | Bahrain | 49 | 429 | 47 | 396 | 4 | 345 |
| 6 | Lebanon | 39 | 466 | 53 | 443 | 8 | 411 |
| 7 | Oman | 36 | 403 | 54 | 407 | 10 | 385 |
| 8 | Palestine | 36 | 403 | 54 | 407 | 10 | 385 |
| 9 | Jordan | 36 | 418 | 59 | 403 | 5 | 355 |
| 10 | Morocco | 26 | 399 | 59 | 364 | 16 | 355 |
| 11 | Tunisia | 22 | 419 | 61 | 427 | 17 | 424 |
| | Dubai /UAE | 80 | 483 | 18 | 453 | 2 | ~ |
| | Abu Dhabi /UAE | 62 | 457 | 38 | 439 | 0 | ~ |
| | Arab average | 45 | 419 | 48 | 402 | 7 | 382 |
| | International average | 45 | 479 | 49 | 458 | 6 | 445 |

- **School Focusing on Achievement from the Teacher's Perspectives**

Table (99) shows the distribution of students' percentages by the extent of the school's focus on achievement from the teacher's point of view. This particular variable is classified into three categories: the school focuses very highly on achievement, the school focuses highly on achievement, and the school moderately focuses on achievement. According to these categories, the percentages of Jordanian students were 4%, 54%, 42% while the performance averages of students in science were 463, 458, 436 respectively. However, these percentages were 6%, 47%, 46% and the performance averages in science were 467, 438, 410 at the Arab level. At the international level, the percentages were 5%, 50%, 46% and the performance averages in science were 504, 487, 463 respectively.

Table (99)
School Focuses on Achievement and
achievement in Science from the Science Teacher's Perspective

| Country | | *Very High Focus | | High Focus | | Moderate Focus | |
|---------|-----------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|---------------------|
| | | Students Percentage % | Performance Average | Students Percentage % | Performance Average | Students Percentage % | Performance Average |
| 1 | Qatar | 16 | 431 | 58 | 432 | 26 | 380 |
| 2 | United Arab Emirates | 9 | 490 | 66 | 465 | 25 | 440 |
| 3 | Saudi Arabia | 9 | 468 | 52 | 443 | 39 | 420 |
| 4 | Bahrain | 9 | 548 | 47 | 460 | 44 | 428 |
| 5 | Oman | 7 | 454 | 53 | 440 | 40 | 388 |
| 6 | Lebanon | 5 | 455 | 50 | 429 | 45 | 374 |
| 7 | Syria | 4 | 429 | 46 | 436 | 50 | 417 |
| 8 | Jordan | 4 | 463 | 54 | 458 | 42 | 436 |
| 9 | Palestine | 2 | ~ | 52 | 423 | 46 | 417 |
| 10 | Tunisia | 2 | ~ | 24 | 438 | 74 | 436 |
| 11 | Morocco | 1 | ~ | 19 | 397 | 80 | 370 |
| | Dubai /UAE | 14 | 508 | 68 | 488 | 18 | 423 |
| | Abu Dhabi /UAE | 9 | 498 | 58 | 461 | 33 | 448 |
| | Arab average | 6 | 467 | 47 | 438 | 46 | 410 |
| | International average | 5 | 504 | 50 | 487 | 46 | 463 |

Table (100) shows the distribution of students' percentages by the extent the school focuses on achievement from teacher's point of view. This particular variable is classified into three categories: very highly, highly, and moderately. The percentages of Jordanian students were 5%, 50%, 45% respectively, while the averages performance of students in math were 447, 416, 390 respectively. However, at the Arab level, these percentages were 6%, 47%, 48% respectively and their performance averages in math were 453, 417, 389 respectively. At the international level, the percentages were 5%, 48%, 47% and the performance averages in math were 506, 478, 452 the performance average for Math and science according to the categories of this variable are less than the performance averages at the international level. .

Regarding the Jordanian, Arab and international levels, there is a positive relation between the students' achievement and the level of school focus on achievement in math and science.

* See the definitions of the measurement categories in appendix (5)

Table (100)
School focus on Achievement
and Students' Achievement in Math from the Teacher's Perspective

| Country | | *Very High Focus | | High Focus | | Moderate Focus | |
|---------|-----------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' percentage % | Performance average | Students' percentage % | Performance average | Students' percentage % | Performance average |
| 1 | Qatar | 19 | 440 | 54 | 413 | 27 | 380 |
| 2 | United Arab Emirates | 11 | 500 | 62 | 457 | 26 | 430 |
| 3 | Saudi Arabia | 8 | 406 | 54 | 406 | 38 | 376 |
| 4 | Bahrain | 5 | 505 | 43 | 428 | 52 | 384 |
| 5 | Oman | 5 | 417 | 54 | 385 | 41 | 334 |
| 6 | Jordan | 5 | 447 | 50 | 416 | 45 | 390 |
| 7 | Lebanon | 4 | 496 | 53 | 465 | 43 | 427 |
| 8 | Syria | 3 | 409 | 45 | 386 | 52 | 371 |
| 9 | Morocco | 2 | ~ | 23 | 393 | 76 | 363 |
| 10 | Palestine | 1 | ~ | 51 | 406 | 47 | 403 |
| 11 | Tunisia | 0 | ~ | 24 | 437 | 76 | 421 |
| | Dubai /UAE | 15 | 499 | 54 | 444 | 30 | 434 |
| | Abu Dhabi /UAE | 11 | 533 | 66 | 479 | 23 | 436 |
| | Arab average | 6 | 453 | 47 | 417 | 48 | 389 |
| | International average | 5 | 506 | 48 | 478 | 47 | 452 |

▪ **Selected Features Derived from the Principal's Questionnaire**

• **Time Allocated to Teach Science**

Table (101) shows the time allocated to teach science throughout the scholastic year, and the time allocated for all other subjects. The total number of hours allocated for teaching all subjects in Jordan was 1041 hours while the Arab level exceeds this number by 15 hours. Nevertheless, the total number of hours allocated for teaching all subjects in Jordan exceeds the international level by 10 hours. Regarding the time allocated to teach science, the number of hours assigned to teach science annually was 134 hours which is higher than time allocated for teaching science at the Arab level by 8 hours, and less than the time allocated for teaching science at the international hours by 24 hours.

* See the definitions of the measurement categories in appendix (5)

Table (101)
Total Time Allocated for Teaching All subjects and for Teaching Science

| | Country | Total Time Allocated for Teaching (/ annually) | Number of Hours Allocated for Teaching Science annually |
|----|-----------------------|---|---|
| 1 | Oman | 1044 | 161 |
| 2 | Syria | 811 | 150 |
| 3 | Morocco | 1303 | 144 |
| 4 | Jordan | 1041 | 134 |
| 5 | Qatar | 1054 | 131 |
| 6 | Bahrain | 1019 | 130 |
| 7 | Saudi Arabia | 1050 | 124 |
| 8 | United Arab Emirates | 1046 | 115 |
| 9 | Palestine | 918 | 107 |
| 10 | Tunisia | 1299 | 64 |
| 11 | Lebanon | 1028 | - |
| | Dubai /UAE | 1022 | 125 |
| | Abu Dhabi /UAE | 1045 | 111 |
| | Arab average | 1056 | 126 |
| | International average | 1031 | 158 |

Table (102) shows the time allocated to teach math throughout the scholastic and the time allocated for teaching all other subjects in Jordan for grade 8. Regarding the time allocated to teach math, the number of hours assigned to teach math annually was 130 hours which is lower than the time allocated for teaching math at the Arab level by 15 hours, and is less than the time allocated for teaching math at the international hours by 8 hours.

Table (102)
Total Time Allocated for teaching all subjects and for teaching math

| Country | | Total Time Allocated to Teach All Subjects Hours/annually | All Number of Hours Allocated to teach Math annually |
|---------|----------------------|--|--|
| 1 | Lebanon | 1028 | 178 |
| 2 | Qatar | 1054 | 162 |
| 3 | Oman | 1044 | 161 |
| 4 | United Arab Emirates | 1046 | 157 |
| 5 | Morocco | 1303 | 148 |
| 6 | Bahrain | 1019 | 142 |
| 7 | Palestine | 918 | 134 |
| 8 | Saudi Arabia | 1050 | 134 |
| 9 | Tunisia | 1299 | 131 |
| 10 | Jordan | 1041 | 130 |
| 11 | Syria | 811 | 118 |

| | | | |
|--|-----------------------|-------------|------------|
| | Dubai /UAE | 1045 | 158 |
| | Abu Dhabi /UAE | 1022 | 155 |
| | Arab average | 1056 | 145 |
| | International average | 1031 | 138 |

- **School Location**

School location was defined in this study in terms of the number of habitants in the location of the school. Therefore, this variable was divided into three categories: school in an area inhabited by more than 10.0000 citizens, an area inhabited by 15001 to 100000 citizens, and an area inhabited by less than or equal to 15000 citizens. Table (103) shows the percentages of students by this variable and their performance in science. The percentage of Jordanian students were distributed over three categories as follows: 26%,31%, 42% respectively, and their performance averages in science were 461, 454, 441 respectively. At the Arab level, the percentages were 29%, 31%, 40% respectively, and the performance averages were 443, 427, 419 respectively. At the international level, the percentages were 37%, 28%, 35% respectively and the performance averages of students' were 492, 473, 463 respectively.

Table (103)
School Location and Achievement in Science

| Country | More than 100000 | | 15001 to 100000 | | 15000 less than or equal to 15000 | |
|-------------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------------------|---------------------|
| | Students Percentage % | Performance Average | Students percentage % | Performance Average | Students percentage % | Performance Average |
| 1 Bahrain | 17 | 453 | 42 | 448 | 41 | 459 |
| 2 Jordan | 26 | 461 | 31 | 454 | 42 | 441 |
| 3 Lebanon | 21 | 434 | 37 | 399 | 42 | 393 |
| 4 Morocco | 47 | 383 | 32 | 376 | 21 | 359 |
| 5 Oman | 8 | 461 | 21 | 432 | 70 | 411 |
| 6 Palestine | 22 | 422 | 35 | 412 | 43 | 426 |
| 7 Qatar | 29 | 450 | 32 | 421 | 39 | 404 |
| 8 Saudi Arabia | 57 | 444 | 18 | 437 | 24 | 416 |
| 9 Syria | 26 | 432 | 26 | 423 | 47 | 424 |
| 10 Tunisia | 16 | 451 | 44 | 443 | 39 | 428 |
| 11 United Arab Emirates | 48 | 483 | 23 | 451 | 30 | 445 |
| Abu Dhabi/UAE | 43 | 484 | 26 | 438 | 31 | 450 |
| Dubai /UAE | 66 | 495 | 16 | 509 | 18 | 438 |
| Arab average | 29 | 443 | 31 | 427 | 40 | 419 |
| International average | 37 | 492 | 28 | 473 | 35 | 463 |

Table (104) shows the percentages of students by the school location variable and the students' achievement in math. The performance averages in math for Jordanian students were 419, 411, 397 respectively. At the Arab level, the performance averages were 423, 405, 396 respectively. At the international level the averages for students' performance were 484, 463, 450 respectively. These numbers indicate that the Jordanian averages in science were higher than those at the Arab level but below the averages at the international level. Regarding math, the averages of both the Arab and the Jordanian levels were close but below the averages at the international level. To sum up, there is a positive relation between the number of people living in area where school is located and students' achievement at the Jordanian, Arab and international levels.

Table (104)
School Location and Achievement in Math

| Country | More than 100000 | | 15001 to 100000 | | 15000 less than or equal to 15000 | |
|-------------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------------------|---------------------|
| | Students Percentage % | Performance Average | Students Percentage % | Performance Average | Students percentage % | Performance Average |
| 1 Bahrain | 17 | 412 | 42 | 404 | 41 | 418 |
| 2 Jordan | 26 | 419 | 31 | 411 | 42 | 397 |
| 3 Lebanon | 21 | 469 | 37 | 445 | 42 | 440 |
| 4 Morocco | 47 | 380 | 32 | 370 | 21 | 353 |
| 5 Oman | 8 | 422 | 21 | 377 | 70 | 355 |
| 6 Palestine | 22 | 408 | 35 | 397 | 43 | 407 |
| 7 Qatar | 29 | 441 | 32 | 413 | 39 | 395 |
| 8 Saudi Arabia | 57 | 403 | 18 | 395 | 24 | 369 |
| 9 Syria | 26 | 385 | 26 | 374 | 47 | 380 |
| 10 Tunisia | 16 | 444 | 44 | 430 | 39 | 410 |
| 11 United Arab Emirates | 48 | 474 | 23 | 444 | 30 | 435 |
| Abu Dhabi/UAE | 43 | 472 | 26 | 427 | 31 | 436 |
| Dubai /UAE | 66 | 488 | 16 | 497 | 18 | 432 |
| Arab average | 29 | 423 | 31 | 405 | 40 | 396 |
| International average | 37 | 484 | 28 | 463 | 35 | 450 |

• Student Economic Background

This study classified the student's economic background into three major levels: high, moderate and low. Table (105) shows the relation between the student economic background and his / her achievement in science. The Jordanian percentages by this variable were 32%,

25%, 43% respectively, and the performance averages were 474, 449, 431 respectively. At the Arab level , the percentages were 40%, 24%, 35% respectively while the performance averages were 444, 435, 416 respectively. On the other hand, the percentages at the international level were 32%, 33%, 36% and the performance percentages were 501, 481, 458 respectively.

Table (105)
Student Economic Background and Achievement in Science

| | Country | *High | | Moderate | | Low | |
|----|-----------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|
| | | Students' percentage % | Performance average | Students' percentage % | Performance average | Students' percentage % | Performance average |
| 1 | Bahrain | 45 | 457 | 28 | 456 | 27 | 444 |
| 2 | Jordan | 32 | 474 | 25 | 449 | 43 | 431 |
| 3 | Lebanon | 21 | 466 | 34 | 413 | 45 | 387 |
| 4 | Morocco | 6 | 416 | 13 | 396 | 81 | 367 |
| 5 | Oman | 43 | 440 | 26 | 413 | 31 | 395 |
| 6 | Palestine | 44 | 426 | 23 | 419 | 33 | 411 |
| 7 | Qatar | 81 | 412 | 16 | 466 | 3 | 425 |
| 8 | Saudi Arabia | 40 | 446 | 30 | 437 | 29 | 427 |
| 9 | Syria | 37 | 431 | 27 | 438 | 36 | 417 |
| 10 | Tunisia | 23 | 449 | 29 | 446 | 48 | 428 |
| 11 | United Arab Emirates | 70 | 468 | 17 | 450 | 13 | 446 |
| | Abu Dhabi/UAE | 76 | 465 | 17 | 443 | 7 | 455 |
| | Dubai /UAE | 71 | 492 | 12 | 459 | 16 | 439 |
| | Arab average | 40 | 444 | 24 | 435 | 35 | 416 |
| | International average | 32 | 501 | 33 | 481 | 36 | 458 |

Table (106) shows the student economic background and his/her achievement in math. The Jordanian performance averages were 431, 402, 388. At the Arab level, the performance averages were 423, 412, 396 respectively, and it was 494, 471, 448 respectively at the international level. It is noted that the Jordanians averages in science are higher than those of the Arab countries. As for math, the Jordanian averages as well as the Arab countries averages were below the international averages which indicates a positive relation between the student economic background and his / her achievement in science and math at the Jordanian, Arab and international levels.

* See the definitions of the measurement categories in appendix (5)

Table 106)
Student Economic Background and Achievement in Math

| Country | *High | | Moderate | | Low | |
|-------------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|---------------------|
| | Students percentage % | Performance Average | Students percentage % | Performance Average | Students Percentage % | Performance Average |
| 1 Bahrain | 45 | 420 | 28 | 408 | 27 | 395 |
| 2 Jordan | 32 | 431 | 25 | 402 | 43 | 388 |
| 3 Lebanon | 21 | 491 | 34 | 455 | 45 | 435 |
| 4 Morocco | 6 | 422 | 13 | 393 | 81 | 361 |
| 5 Oman | 43 | 386 | 26 | 360 | 31 | 339 |
| 6 Palestine | 44 | 411 | 23 | 402 | 33 | 393 |
| 7 Qatar | 81 | 403 | 16 | 448 | 3 | 435 |
| 8 Saudi Arabia | 40 | 405 | 30 | 394 | 29 | 382 |
| 9 Syria | 37 | 388 | 27 | 392 | 36 | 371 |
| 10 Tunisia | 23 | 439 | 29 | 432 | 48 | 411 |
| 11 United Arab Emirates | 70 | 459 | 17 | 442 | 13 | 441 |
| Abu Dhabi/UAE | 76 | 453 | 17 | 429 | 7 | 446 |
| Dubai /UAE | 71 | 484 | 12 | 449 | 16 | 434 |
| Arab average | 40 | 423 | 24 | 412 | 35 | 396 |
| International average | 32 | 494 | 33 | 471 | 36 | 448 |

- School Focusing on Achievement in Science from Principal's Perspective**

The school focusing on achievement from the principal's perspective variable is classified into three categories: very high focus, high focus and moderate focus. Table (107) shows the distribution of the students' percentages and the students' performance averages in the participating Arab countries by this variable. The percentages of Jordanian students were 5%, 56%, 39% respectively, while the averages for students' performance in science were 479, 459, 431 respectively. At the Arab level, these percentages were 7%, 49%, 44% respectively, and the performance averages in science were 463, 436, 409 respectively. At the International level, the percentages were 7%, 53%, 41% respectively and the matched performance averages in science were 504, 486, 460 respectively.

* See the definitions of the measurement categories in appendix (5)

Table (107)
School Focusing on Achievement and Achievement in Science from Principal's Perspective

| Country | *Very High | | High | | Moderate | |
|------------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|---------------------|
| | Students Percentage % | Performance Average | Students Percentage % | Performance Average | Students percentage % | Performance Average |
| 1 Qatar | 27 | 461 | 57 | 404 | 16 | 388 |
| 2 United Arab Emirates | 17 | 505 | 63 | 463 | 20 | 433 |
| 3 Oman | 7 | 453 | 67 | 429 | 25 | 383 |
| 4 Saudi Arabia | 7 | 466 | 48 | 439 | 45 | 428 |
| 5 Jordan | 5 | 479 | 56 | 459 | 39 | 431 |
| 6 Syria | 4 | 402 | 39 | 439 | 57 | 420 |
| 7 Bahrain | 4 | 552 | 57 | 468 | 40 | 420 |
| 8 Morocco | 3 | 442 | 26 | 394 | 71 | 367 |
| 9 Palestine | 3 | 410 | 52 | 423 | 46 | 418 |
| 10 Lebanon | 2 | ~ | 59 | 431 | 39 | 371 |
| 11 Tunisia | 1 | ~ | 18 | 452 | 82 | 436 |
| Dubai/UAE | 28 | 528 | 59 | 480 | 13 | 417 |
| Abu Dhabi | 13 | 501 | 64 | 463 | 22 | 433 |
| Arab average | 7 | 463 | 49 | 436 | 44 | 409 |
| International average | 7 | 504 | 53 | 486 | 41 | 460 |

Table (108) shows the percentages of students and their performance averages in the participating Arab countries in Math. The performance averages of Jordanian students in math according to this variable were 439, 415, 389 respectively, while the performance averages at the Arab level were 440, 415, 389 respectively. At the International level, the performance averages were 495, 477, 499 respectively. These averages show that the Jordanian average in science were higher than those of the Arab countries, yet both averages were lower than the international level. As for math, the Jordanian and Arab averages were close but still lower than those of international averages. In addition, there is a positive relation between the variable of the school's focus on achievement and students' achievement in science.

* See the definitions of the measurement categories in appendix (5)

Table (108)
School Focus on Achievement in Math from Principal's Perspective

| Country | | *Very High | | High | | Moderate | |
|---------|-----------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|---------------------|
| | | Students Percentage % | Performance Average | Students Percentage % | Performance Average | Students Percentage % | Performance Average |
| 1 | Qatar | 27 | 453 | 57 | 395 | 16 | 378 |
| 2 | United Arab Emirates | 17 | 497 | 63 | 453 | 20 | 426 |
| 3 | Oman | 7 | 407 | 67 | 373 | 25 | 332 |
| 4 | Saudi Arabia | 7 | 442 | 48 | 396 | 45 | 383 |
| 5 | Jordan | 5 | 439 | 56 | 415 | 39 | 389 |
| 6 | Syria | 4 | 350 | 39 | 394 | 57 | 373 |
| 7 | Bahrain | 4 | 522 | 57 | 425 | 40 | 375 |
| 8 | Morocco | 3 | 450 | 26 | 393 | 71 | 360 |
| 9 | Palestine | 3 | 404 | 52 | 408 | 46 | 400 |
| 10 | Lebanon | 2 | ~ | 59 | 467 | 39 | 424 |
| 11 | Tunisia | 1 | ~ | 18 | 443 | 82 | 421 |
| | Dubai/UAE | 28 | 519 | 59 | 470 | 13 | 418 |
| | Abu Dhabi | 13 | 495 | 64 | 449 | 22 | 422 |
| | Arab average | 7 | 440 | 49 | 415 | 44 | 387 |
| | International average | 7 | 495 | 53 | 477 | 41 | 449 |

●**Availability of Computers for Teaching**

Table (109) shows the availability of computers for teaching science. This variable includes four categories: availability of a computer for (1–2) students, availability of a computer for (3–5) students, and availability of a computer for 6 students and more, and no computers at the school. The percentages for the Jordanian students were 31%, 41%, 26%, 2% while the performance averages were 442, 454, 451. At the Arab level, the percentages were 26%, 29%, 38%, 6% and the performance averages were 434, 432, 426, 396. However, at the international level, the percentages were 40%, 28%, 28%, 4% and the performance averages were 481, 480, 474, 408.

* See the definitions of the measurement categories in appendix (5)

Table 109)
Availability of Computers for Teaching and Achievement in Science

| Country | Computer students per(1-2) | | Computer students per (3-5) | | Computer per 6 students and more | | Schools without computers | |
|-------------------------|----------------------------|---------------------|-----------------------------|---------------------|----------------------------------|---------------------|---------------------------|---------------------|
| | Students Percentage % | Performance Average | Students Percentage % | Performance Average | Students Percentage % | Performance Average | Students Percentage % | Performance Average |
| 1 Bahrain | 32 | 456 | 35 | 456 | 26 | 446 | 7 | 414 |
| 2 Jordan | 31 | 442 | 41 | 454 | 26 | 451 | 2 | ~ |
| 3 Lebanon | 38 | 422 | 40 | 405 | 16 | 405 | 5 | 347 |
| 4 Morocco | 6 | 404 | 10 | 393 | 70 | 373 | 13 | 372 |
| 5 Oman | 47 | 427 | 34 | 415 | 15 | 419 | 4 | 429 |
| 6 Palestine | 25 | 452 | 21 | 433 | 49 | 405 | 5 | 378 |
| 7 Qatar | 44 | 435 | 48 | 409 | 7 | 410 | 1 | ~ |
| 8 Saudi Arabia | 14 | 440 | 17 | 453 | 37 | 430 | 32 | 435 |
| 9 Syria | 8 | 415 | 24 | 436 | 68 | 424 | 1 | ~ |
| 10 Tunisia | 5 | 414 | 10 | 441 | 86 | 441 | 0 | ~ |
| 11 United Arab Emirates | 37 | 465 | 41 | 458 | 21 | 480 | 1 | ~ |
| Dubai/UAE | 36 | 459 | 42 | 459 | 20 | 467 | 2 | ~ |
| Abu Dhabi | 45 | 490 | 32 | 474 | 23 | 511 | 0 | ~ |
| Arab average | 26 | 434 | 29 | 432 | 38 | 426 | 6 | 396 |
| International average | 40 | 481 | 28 | 480 | 28 | 474 | 4 | 408 |

Table (110) shows the availability of computers for teaching math. The percentages for Jordanian students were 399, 413, 406 respectively. At the Arab level, the performance averages were 413, 412, 404, 375 respectively. However, the performance averages at the international level were 472, 472, 467, 396 respectively. The relation between the availability of computers and the students' achievement in science and math was positive at the Arab and international levels while it was a curved relation at the Jordanian level.

Table (110)
Availability of Computers and student's achievement in math

| Country | | a computer per(1-2) students | | a computer per(3-5) students | | a computer per 6 students and more | | a school without computers | |
|---------|-----------------------|------------------------------|---------------------|------------------------------|---------------------|------------------------------------|---------------------|----------------------------|---------------------|
| | | Students Percentage % | Performance Average | Students Percentage % | Performance Average | Students Percentage % | Performance Average | Students Percentage % | Performance Average |
| 1 | Bahrain | 32 | 414 | 35 | 414 | 26 | 397 | 7 | 368 |
| 2 | Jordan | 31 | 399 | 41 | 413 | 26 | 406 | 2 | ~ |
| 3 | Lebanon | 38 | 461 | 40 | 451 | 16 | 449 | 5 | 395 |
| 4 | Morocco | 6 | 405 | 10 | 394 | 70 | 368 | 13 | 364 |
| 5 | Oman | 47 | 373 | 34 | 359 | 15 | 369 | 4 | 373 |
| 6 | Palestine | 25 | 433 | 21 | 416 | 49 | 390 | 5 | 362 |
| 7 | Qatar | 44 | 422 | 48 | 406 | 7 | 407 | 1 | ~ |
| 8 | Saudi Arabia | 14 | 404 | 17 | 415 | 37 | 386 | 32 | 389 |
| 9 | Syria | 8 | 371 | 24 | 390 | 68 | 377 | 1 | ~ |
| 10 | Tunisia | 5 | 399 | 10 | 426 | 86 | 427 | 0 | ~ |
| 11 | United Arab Emirates | 37 | 457 | 41 | 449 | 21 | 469 | 1 | ~ |
| | Dubai/UAE | 36 | 450 | 42 | 445 | 20 | 452 | 2 | ~ |
| | Abu Dhabi | 45 | 482 | 32 | 467 | 23 | 501 | 0 | ~ |
| | Arab average | 26 | 413 | 29 | 412 | 38 | 404 | 6 | 375 |
| | International average | 40 | 472 | 28 | 472 | 28 | 467 | 4 | 396 |

• School Discipline

The study divided school discipline into three categories: schools with no discipline problems, schools with minor discipline problems and schools with moderate discipline problems. Table (111) shows school discipline variable, and achievement in science. Jordanian percentages were distributed over the categories of this variable and with the same order as follows: 8%, 54%, 38% respectively, while performance averages for Jordanian students were 463, 452, 442 respectively.

At the Arab level the percentages were 16%, 49%, 35% respectively and the performance averages were 442, 426, 421 respectively. At the international level, the percentages were as follows: 16%, 66%, 18% respectively and the performance averages were 492, 477, 452 respectively.

Table (111)
Study Discipline and Achievement in Science

| Country | | *No Discipline Problems | | Minor Problems | Discipline | moderate Problems | Discipline |
|---------|-----------------------|-------------------------|---------------------|-----------------------|---------------------|-----------------------|---------------------|
| | | Students Percentage % | Performance Average | Students Percentage % | Performance Average | Students Percentage % | Performance Average |
| 1 | Qatar | 34 | 437 | 52 | 406 | 14 | 408 |
| 2 | United Arab Emirates | 25 | 491 | 56 | 456 | 19 | 452 |
| 3 | Oman | 23 | 451 | 49 | 412 | 28 | 408 |
| 4 | Saudi Arabia | 23 | 439 | 47 | 440 | 30 | 432 |
| 5 | Lebanon | 20 | 406 | 63 | 411 | 17 | 383 |
| 6 | Bahrain | 16 | 480 | 61 | 450 | 23 | 441 |
| 7 | Palestine | 12 | 443 | 56 | 418 | 32 | 417 |
| 8 | Jordan | 8 | 463 | 54 | 452 | 38 | 442 |
| 9 | Morocco | 6 | 416 | 39 | 365 | 55 | 380 |
| 10 | Tunisia | 4 | 434 | 37 | 435 | 60 | 442 |
| 11 | Syria | 3 | 404 | 27 | 441 | 70 | 422 |
| | Dubai/UAE | 43 | 500 | 44 | 480 | 13 | 452 |
| | Abu Dhabi | 19 | 494 | 64 | 455 | 17 | 449 |
| | Arab average | 16 | 422 | 49 | 426 | 35 | 421 |
| | International average | 16 | 492 | 66 | 477 | 18 | 452 |

Table (112) shows the school discipline variable and achievement in math. The Jordanian performance averages according to the levels of school discipline variable for Jordanian students were 416, 409, 400 respectively, and at the Arab level were 418, 404, 400 respectively, while at the international level they were 483, 467, 437 respectively.

It is noted that Jordanian schools show a lower degree of discipline in comparison with Arab countries and international ones. As for performance averages for Jordanian students, they were better than those of Arab countries, yet lower than international level in science and math. The students' performance averages for Jordanian and Arab students were quite close.

The performance averages by the school discipline variable indicated a positive relation between the degree of school discipline and achievement in science or math at the Jordanian, Arab and international levels. The relation was also positive in science at the Jordanian and international levels while it was a curved one at the Arab level.

* See the definitions of the measurement categories in appendix (5)

Table 112
School Discipline and Achievement in Math

| Country | *No Discipline Problems | | Minor Discipline Problems | | moderate Discipline Problems | |
|------------------------|-------------------------|---------------------|---------------------------|---------------------|------------------------------|---------------------|
| | Students Percentage % | Performance Average | Students Percentage % | Performance Average | Students Percentage % | Performance Average |
| 1 Qatar | 34 | 420 | 52 | 402 | 14 | 401 |
| 2 United Arab Emirates | 25 | 482 | 56 | 448 | 19 | 442 |
| 3 Oman | 23 | 395 | 49 | 357 | 28 | 355 |
| 4 Saudi Arabia | 23 | 400 | 47 | 395 | 30 | 391 |
| 5 Lebanon | 20 | 449 | 63 | 454 | 17 | 432 |
| 6 Bahrain | 16 | 436 | 61 | 406 | 23 | 399 |
| 7 Palestine | 12 | 426 | 56 | 402 | 32 | 400 |
| 8 Jordan | 8 | 416 | 54 | 409 | 38 | 400 |
| 9 Morocco | 6 | 414 | 39 | 360 | 55 | 375 |
| 10 Tunisia | 4 | 414 | 37 | 421 | 60 | 428 |
| 11 Syria | 3 | 349 | 27 | 394 | 70 | 376 |
| Dubai/UAE | 43 | 491 | 44 | 474 | 13 | 443 |
| Abu Dhabi | 19 | 481 | 64 | 443 | 17 | 434 |
| Arab average | 16 | 418 | 49 | 404 | 35 | 400 |
| International average | 16 | 483 | 66 | 467 | 18 | 437 |

* See the definitions of the measurement categories in appendix (5)

Chapter six

Decline Factors

Jordan has participated in TIMSS in the last four cycles 1999,2003,2007,2011. The results of last two cycles (2007, 2011) have revealed a significant decline in students' performance in math and science as shown in table (1).

Students' performance in math has declined by 21 scores and 33 scores in science. Male's performance has went down to 25 scores in math and 38 scores in science whereas females' performance has decreased 28 scores in science and 18 scores in math. It is worth mentioning that males' performance in both math and science has recorded a higher decline in comparison with females' performance. According to the school location, the performance of students in rural areas has dropped by 40 scores in math and 54 scores in science. Shedding the light on students in the urban areas, the table shows that students' performance has dropped by 17 scores in math and 27 in science. Therefore, the decline in rural areas was more than the decline in urban areas in science and math. In addition, the averages of students in the urban areas were higher than those of the students in the rural areas with statistical significance. Students' averages in science were better than in math at all levels.

Table (113)
Decline size in Math and Science in 2007, 2011 by
Selected Characteristics of Jordanian Students

| | | Math decline | Science decline |
|-----------------------|-------------------|--------------|-----------------|
| Supervising Authority | MoE | 18 | 32 |
| | Private Education | 17 | 22 |
| | UNRWA | 57 | 59 |
| | The whole kingdom | 21 | 33 |
| Sex | Males | 25 | 38 |
| | Females | 18 | 28 |
| | The whole kingdom | 21 | 33 |
| Location | Urban | 17 | 27 |
| | Rural | 40 | 54 |
| | The whole kingdom | 21 | 33 |

UNRWA students' averages recorded the highest decline among other schools. Their performance have gone down to 57 scores in math and 59 scores in science. It is noteworthy that students' performance in MoE schools declined 18 scores in math and 32 in science. Having a look at private schools, students' performance has recorded the lowest decline in both subjects. Their performance has declined 17 marks in math and 22 marks in science. To sum up,

according to the supervising authority, students of private schools have the best performance, followed by students of UNRWA schools and then the MoE schools.

One can conclude that :

- UNRWA students' performance has the highest decline followed by the MoE schools and then the private schools.
- Males have a higher decline than females.
- Students of rural schools have a higher decline than students of the city.

This paper will focus on a group of variables related to students, teachers and school principals. The paper will present a comparison between 2007 and 2011 to investigate what variables that might have an effect on the decline in 2011 from the results of 2007.

• **Students' Economic Background**

Table (2) shows students' performance averages in math and science according to students' economic background in TIMSS 2007, 2011. The table indicates the following:

- There is no substantial difference in students' economic background between 2007 and 2011.
- The number of students coming from low class in 2011 has risen from 1% (2007) to 43%.
- The number of students coming from high class in 2011 has risen from 2% (2007) to 32%.
- The number of students coming from middle class in 2011 has fallen 3% compared to 2007 (25%).

There is a positive relation between students' performance in math and science and their economic backgrounds.

Table (114)
Averages in Math and Science, and the percentages of Jordanian students by their economic background indicator in TIMSS for 2007 ,2011.

| Subject | Year | High | | Medium | | Low | |
|---------|------|--------------|---------|--------------|---------|--------------|---------|
| | | Percentage % | Average | Percentage % | Average | Percentage % | Average |
| Math | 2011 | 32 | 431 | 25 | 402 | 43 | 388 |
| | 2007 | 30 | 450 | 28 | 423 | 42 | 412 |
| Science | 2011 | 32 | 474 | 25 | 449 | 43 | 431 |
| | 2007 | 30 | 503 | 28 | 477 | 42 | 470 |

- **Teacher's working conditions**

Table (3) shows average of Jordanian students' performance in both math and science in 2007,2011 according to teacher's working conditions.

The table pinpoints the following :

- Science teacher's working conditions are better in 2011 than in 2007.
- The percentage of science teachers who feel that their working conditions are low has risen up from 38% in 2007 to 46% in 2011.
- The percentage of math teachers who feel that their working conditions are low has recorded 45% in 2007 and 2011.

There is a positive correlation between students' performance in math and science and teacher's working conditions.

Table (115)
Averages in math and science , and the percentages of students
by teacher's working conditions indicator in TIMSS 2007,2011.

| Subjects | Year | High | | Moderate | | Low | |
|----------|------|--------------|---------|--------------|---------|--------------|---------|
| | | Percentage % | Average | Percentage % | Average | Percentage % | Average |
| Math | 2011 | 14 | 419 | 41 | 412 | 45 | 396 |
| | 2007 | 6 | 468 | 48 | 425 | 45 | 424 |
| Science | 2011 | 17 | 484 | 37 | 453 | 46 | 432 |
| | 2007 | 5 | 470 | 58 | 489 | 38 | 471 |

- **Safe school**

Table (4) shows the Jordanian students' performance averages in math and science in 2007, 2011 by the safe school indicator. The table indicates the percentage of students classified by the safe school indicator in 2011 as follows: 36% high, 59% moderate, and 5% low. In 2007, they were 53%, 38% and 9% respectively. These percentages indicate that schools are less safer in 2011 than in 2007. It is worth mentioning that there is a positive correlation between students' performance and the safe school variable in 2007, 2011.

Table (116)
Averages in math and science, and the percentages of students
by safe school indicator in TIMSS 2007 ,2011

| Subject | Year | High | | Moderate | | Low | |
|---------|------|--------------|---------|--------------|---------|--------------|---------|
| | | Percentage % | Average | Percentage % | Average | Percentage % | Average |
| Math | 2011 | 36 | 418 | 59 | 403 | 5 | 355 |
| | 2007 | 53 | 445 | 38 | 417 | 9 | 394 |
| Science | 2011 | 36 | 466 | 53 | 446 | 11 | 406 |
| | 2011 | 53 | 500 | 38 | 474 | 9 | 442 |

- **Teacher's experience**

Table (5) shows the performance average of students' in math and science in 2007 ,2011 according to the teacher's experience. Math teachers have 11 years' experience in 2011 vs. 10 years in 2007. Science teachers have 8 years' experience in 2011 vs. 9 years in 2007. Generally, there is no substantial difference in years of experience for both math and science teachers in 2007 and 2011.

Table (117)
Averages in math and science , and the percentages of students'
by teacher's years of experience school indicator in TIMSS 2007 and 2011.

| Subject | Year | Years of experience |
|---------|------|---------------------|
| Math | 2011 | 11 |
| | 2007 | 10 |
| | | |
| Science | 2011 | 8 |
| | 2007 | 9 |

- There is no substantial difference in teachers of math and science experience in 2007and 2011.

- **Teacher's educational level**

Table (6) shows the percentages of Jordanian teachers by their educational levels in 2007 and 2011. The percentage of math teachers having master's degree or higher was 12% in 2011 and was 13% in 2007. The percentage of teachers having bachelor degree in 2011 was 75%, and was 76% in 2007. Other teachers who have community colleges diploma were 13% in 2011 and 11% in 2007. The percentages in science in 2011 were 12% master's degree, 83% bachelor degree and 5% community colleges diploma while these percentages were 9%, 86%, 4% respectively in 2007.

Table (118)
Percentages of Jordanian teachers by the educational level indicator in 2007 and 2011

| Subject | Year | M.A or higher | B.A | Diploma |
|---------|------|---------------|-----|---------|
| Math | 2011 | 12 | 75 | 13 |
| | 2007 | 13 | 76 | 11 |
| Science | 2011 | 12 | 83 | 5 |
| | 2007 | 9 | 86 | 4 |

- Teachers' educational levels were close in 2007 and 2011.

Subject Value at Student

Table (7) shows the students' performance averages in math and science between 2007 and 2011 by the students' attitudes. The percentage of students who highly appreciate math in 2011 was 69%, while the ones who moderately appreciate math 24%, and 7% for those who don't appreciate math.

The table shows that the students' performance averages in math were 422, 393, 349 respectively. In 2007, the percentages in math were 92% , 6% and 2% respectively.

Table (119)
Averages for Jordanian students in math and science in 2007 and 2011 by subject value at Students indicator

| Subject | Year | High | | Moderate | | Low | |
|---------|------|--------------|---------|--------------|---------|--------------|---------|
| | | Percentage % | Average | Percentage % | Average | Percentage % | Average |
| Math | 2011 | 69 | 422 | 24 | 393 | 7 | 340 |
| | 2007 | 92 | 390 | 6 | 370 | 2 | - |
| Science | 2011 | 66 | 468 | 25 | 437 | 8 | 403 |
| | 2007 | 88 | 491 | 10 | 446 | 2 | - |

- Students' attitudes towards math and science in 2007 were obviously better than 2011.

Teaching Hours for Students

Table (8) shows the number of hours allocated for teaching math and science during 2007 and 2011. 130 hours were allocated for teaching math in 2011 and 141 hours in 2007. This means that there is a decline in the numbers of hours allocated in 2011 compared to 2007.

Table (120)
Total Number Hours of Teaching Math and Science in 2007 and 2011.

| | Year | Teaching hours |
|---------|------|----------------|
| Math | 2011 | 130 |
| | 2007 | 141 |
| Science | 2011 | 134 |
| | 2007 | 141 |

- A decline in the number of teaching hours during 2011 in comparison with 2007.

• Teachers' preparation for teaching

Table (9) shows percentages of students whose teachers are fully prepared for teaching math and science. The results showed that 84% were fully prepared to teach math for 2011 and 89% in 2007.

By the math content, the percentages for the numbers content were as follows: 92% in 2011 vs. 94% in 2007. Algebra content has reached 92% in 2007 and in 2011. Geometry was 87% in 2011 vs. 85% in 2007. Statistics and probabilities content was 51% in 2011 vs. 84% in 2007.

2011 Results showed that 77% of science teachers are fully prepared to teach and 70% in 2007. According to the scientific content, biology content has reached 79%, 76% in 2011 and 2007 respectively and in chemistry content 84% for the year 2011 and 76% in 2007. In physics, in 2011 it was 78% , and it was 74% in 2007. In geology content , it was 67% in 2011 and 64% in 2007.

Table (121)
Percentages of students who feel that their teachers well-prepared for teaching math and science

| Subject | Year | Math | Numbers | Algebra | Geometry | Statistics and probabilities |
|---------|------|---------|---------|-----------|----------|------------------------------|
| Math | 2011 | 84 | 92 | 92 | 87 | 51 |
| | 2007 | 89 | 94 | 92 | 85 | 84 |
| | Year | Science | Biology | Chemistry | Physics | Geology |
| Science | 2011 | 77 | 79 | 84 | 78 | 67 |
| | 2007 | 70 | 67 | 76 | 74 | 64 |

The total of the percentages reflects a decline in math and progress in science as shown below:

- The preparation of math teachers for the year 2007 was better than 2011.
- The preparation of math teachers for the year 2011 has declined noticeably in statistics and probabilities content in comparison with 2007.
- The preparation of science teachers in 2011 was better than 2007.

- **Availability of resources**

Table (10) shows performance averages of Jordanian students' according to the availability of resources for 2007 and 2011. Students were divided into three categories: high ,moderate and low. In 2011 , the number of students who have available resources at schools in math are as follows: 10%, 80%, 11% respectively and in 2007 24% ,69% ,7% respectively .

Table (122)
Averages and percentages for Jordanian students by
the availability of educational resources for teaching math and science indicator 2007,2011

| Subject | Year | High | | Moderate | | Poor | |
|---------|------|--------------|---------|--------------|---------|--------------|---------|
| | | Percentage % | Average | Percentage % | Average | Percentage % | Average |
| Math | 2011 | 10 | 423 | 78 | 402 | 12 | 419 |
| | 2007 | 21 | 439 | 70 | 423 | 9 | 428 |
| Science | 2011 | 10 | 470 | 80 | 444 | 11 | 469 |
| | 2007 | 24 | 496 | 69 | 476 | 7 | 490 |

The students' performance averages in math according to the categories were 423, 402, 419 in 2011 and 439, 423, 428 in 2007 whereas in science 470, 444, 469 in 2011, and 496,476,490 in 2007. These percentages indicate the following:

- The availability of resources for teaching both math and science were better in 2007 than in 2011.
- Most students study at schools having some resources for teaching math and science at a moderate level. Their performance averages in both subjects were below the average of schools having more resources or having low resources.

- **Availability of computers**

Table (11) shows the Jordanian students' performance by the availability of computers at schools to be used for teaching math and science.

The results reveal that 53% of students study math at schools having computers in 2011 while in 2007 the percentage was 79%. Students' performance averages by the availability of computers was as follows: 407, 406 in 2011 and 435 ,420 in 2007.

Regarding science, the performance averages in 2011 by this variable 457 vs. 441. In 2007 these averages were 478 and 474. These percentages and averages show that in 2007, the number of computers available for teaching was better than in 2011 in both subjects. This means there is a positive relation between having computers for teaching and students' achievement in math and science regardless of the study's cycles.

Table (123)
Averages and percentages for Jordanian students by the availability of computers at schools used in teaching math and science

| Subject | Year | Yes | | No | |
|---------|------|--------------|---------|--------------|---------|
| | | Percentage % | Average | Percentage % | Average |
| Math | 2011 | 53 | 407 | 47 | 406 |
| | 2007 | 79 | 435 | 21 | 420 |
| Science | 2011 | 49 | 457 | 51 | 441 |
| | 2007 | 79 | 487 | 21 | 474 |

The following implications can be drawn regarding the factors that witnessed notable changes in TIMSS in 2011:

- The availability of computers for teaching math in 2011 is less than 2007.
- Using computers does not affect students' performance in math (an indicator on the lack of available computers are the schools).
- The availability of computers for teaching science in 2011 is less than 2007.
- There is a positive effect for using computers on students' achievement in science.

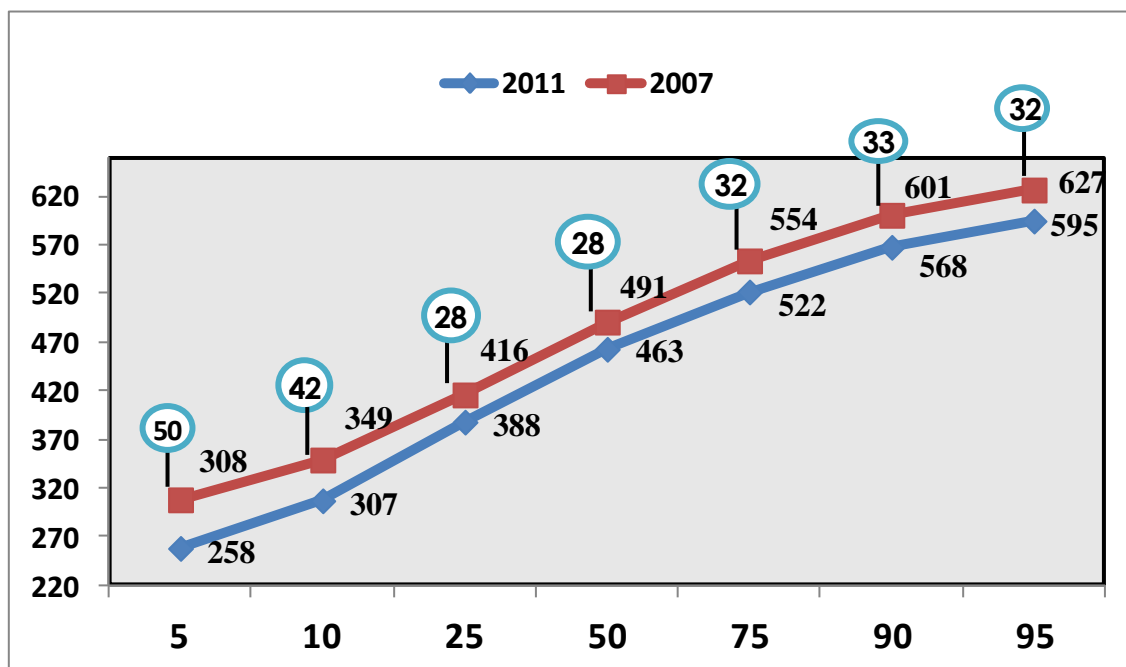
Decline size according to percentile

Table (12) shows the percentile distribution in math and science according by year. Figures (1),(2) show the distribution of percentile in 2007,2011 for science and math respectively.

Table (124)
The Distribution of Percentile in Math and Science by Year

| Subject | Year | Percentile 5 | Percentile 10 | Percentile 25 | Percentile 50 | Percentile 75 | Percentile 90 | Percentile 95 |
|---------|------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Math | 2011 | 232 | 271 | 340 | 413 | 479 | 528 | 556 |
| | 2007 | 253 | 290 | 356 | 433 | 503 | 556 | 584 |
| Science | 2011 | 258 | 307 | 388 | 463 | 522 | 568 | 595 |
| | 2007 | 308 | 349 | 416 | 491 | 554 | 601 | 627 |

The percentiles 5,10,25,50,75,90,95 were calculated in math and science for 2007 and 2011, then the differences among the similar percentiles were also calculated as measure for the decline size by percentiles. The decline size in science were 50,42,28,28,32,33,32. These declines reflect a difference in the decline size by the students' abilities. The students of low performance have the highest decline 50 ,42 while students with high performance have ranked the second in the decline size 33, 32. Students with moderate levels have the lowest decline as the decline size at the 50, 25 percentiles was (28).



Figure(13)
Distribution of Percentile in Science

On the contrary, in Math, the highest decline was recorded for students of high achievement levels, followed by students with moderate ability and finally the students with low achievement levels who scored the lowest decline.

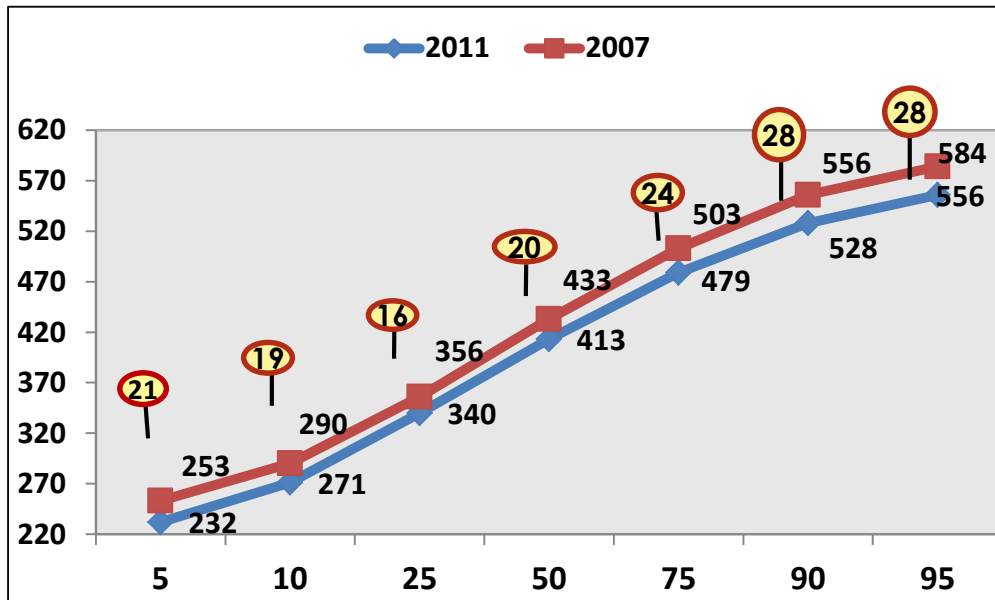


Figure (14)
Distribution of percentile in math

International Change in Achievement

Countries participating in TIMSS were categorized into three categories by the difference in students' achievement in math and science for 2007 and 2011. The change is considered progress if the difference between the performance averages was statistically significant in favor of 2011, and is considered a decline if it was statistically significant in favor of 2007. If the difference does not show any statistical significance, then the change is considered stable. Table (13) shows the difference in students' performance in TIMSS in 2007, 2011 by the participating countries. Table (14) shows the change in achievement in science in TIMSS 2007 and TIMSS 2011 by the participating countries in grade 8.

Table (125)
Change in Achievement in Science in TIMSS 2007, 2011
by Countries Participating in both cycles / Eighth Grade

| Progress | Stable | Decline |
|-----------|-----------|-----------|
| Iran | Australia | Bahrain |
| Italy | Taiwan | Hungary |
| Korea | Britain | Indonesia |
| Norway | Georgia | Jordan |
| Palestine | Ghana | Malaysia |
| Russia | Hong Kong | Syria |
| Singapore | Japan | Thailand |
| Ukraine | Lebanon | |
| | Lithuania | |
| | Oman | |
| | Romania | |
| | Slovenia | |
| | Sweden | |
| | Tunisia | |
| | USA | |

Table No (14) shows the difference in students' performance in math. The following eight countries have made progress in science: Iran, Italy, Korea, Norway, Palestine, Russia, Singapore and Ukraine, while the following ten countries have made progress in math: Bahrain, Taiwan , Georgia ,Italy, Korea, Norway , Palestine , Russia, Singapore and Ukraine.

Table (126)
Change in achievement in math in TIMSS 2007,2011 by
countries participating in both cycles / eighth grade

| Progress | Stable | Decline |
|------------------|------------------|-----------------|
| Bahrain | Australia | Hungary |
| Taiwan | Britain | Jordan |
| Georgia | Hong Kong | Malaysia |
| Italy | Indonesia | Sweden |
| Korea | Iran | Syria |
| Norway | Japan | Thailand |
| Palestine | Lebanon | |
| Russia | Lithuania | |
| Singapore | Oman | |
| Ukraine | Romania | |
| | Slovenia | |
| | Tunisia | |
| | USA | |

Fifteen countries have stable performance in science, and eleven countries have stable performance in math. The following eleven countries stable performance in both subjects: Australia , Britain , Hong Kong , Japan , Lebanon , Lithuania , Oman , Romania , Slovenia ,Tunisia and the USA. Five countries have decline in their performance in both subjects: Hungary , Jordan , Malaysia , Syria, and Thailand.

To sum up, the factors that encounter a substantial change in 2007, 2011 which are considered as proposed decline factors in 2011:

- Safe school has declined to 36% in 2011 whereas it was 53% in 2007.
- Students' positive attitudes towards math and science has declined to 20% in 2011 in comparison with 2007.
- The number of hours allocated for teaching math has gone down 11 hours which is equivalent to 15 classes whereas the number of hours in science has declined to 7 which is equivalent to 9 classes, in addition to 14 classes for both subjects because of the teachers' strike in 2011.

- The resources for teaching math and science have declined in 2011 in comparison with 2007. The decline was 11% in math and 14% in science.
- Schools having computers as a teaching tool have declined to 30% in science and 26% in math.
- 18% of students performance was below the guessing level in 2011. This indicates that either students' were not serious during the exam or inability to know the correct answer which leads them to guess.

It is worth mentioning that the education issue becomes more complex and difficult to explain. In addition to the above-mentioned results, 2011 has encountered abnormal conditions compared to 2007 teacher strike.

To have a more detailed view about the reasons and factors behind the decline in students' performance in math and science, the common items of 2007 and 2011 questionnaires were analyzed and the results will be displayed according to the used questionnaires; school questionnaire, science teacher questionnaire, math teacher questionnaire and student questionnaire. New variables are being derived through the items of questionnaires to reach new valid and reliable scales which are better than measuring the traits of every item alone.

1- Results of school questionnaire

The common items in the school questionnaire in 2007, 2011 were identified then the averages of all items were calculated as well as the difference between the averages of every item in 2007 and in 2011 and the statistical significance of these differences using T-test for the independent samples. Table (15) shows the results of the analysis.

Table (127)
Results of school questionnaire in 2007 and 2011 in TIMSS

| Item | Item | Average | | difference | significance level $\alpha = 0.05$ |
|----------|--|---------|--------|------------|---------------------------------------|
| | | 2011 | 2007 | | |
| BCBG01 | What is the total number of enrolled students until 1.4.2011? | 603.1 | 546.72 | 56.4 | |
| BCBG02 | What is the total number of eighth grade students until 1.4.2011? | 84.2 | 72.1 | 12.1 | ✓ |
| | What is the percentage of your students economic level according to the following social levels? | | | | |
| BCBG03A | Poor social level | 40.53 | 46.66 | 6.13 | |
| BCBG03B | Moderate social level | 35.54 | 19.53 | 16.01 | ✓ |
| BCBG08A | Is there a science lab in your school for eighth grade students? | 0.84 | 0.92 | 0.08 | |
| BCBG08B | Are science teachers being helped in the lab while doing experiments? | 0.93 | 0.85 | 0.08 | ✓ |
| | To what extent is your school able to do in the following: | | | | |
| | School general resources | | | | |
| BCBG09AA | learning resources (textbook s) | 1.83 | 0.18 | 1.65 | ✓ |
| BCBG09AB | Stationary (papers and pencils) | 1.74 | 0.57 | 1.17 | ✓ |
| BCBG09AC | School buildings and playgrounds | 1.67 | 1.28 | 0.39 | ✓ |
| BCBG09AD | Heating equipment , conditioning ,and lighting | 1.62 | 2.03 | 0.41 | ✓ |
| BCBG09AE | Spaces for learning (classrooms) | 1.92 | 1.09 | 0.83 | ✓ |
| | Math teaching resources | | | | |
| BCBG09BB | Computers for teaching math | 1.32 | 1.62 | 0.30 | ✓ |
| BCBG09BC | Software for teaching math | 1.43 | 1.49 | 0.06 | |
| BCBG09BD | Library resources for teaching math | 1.21 | 1.27 | 0.06 | |
| BCBG09BE | Audio-visual aids for teaching math | 1.11 | 2.03 | 0.92 | ✓ |
| BCBG09BF | Calculators for teaching math | 1.17 | 1.43 | 0.26 | ✓ |
| | Science teaching resources | | | | |
| BCBG09CA | Teachers majoring in science | 2.01 | 0.54 | 1.47 | ✓ |
| BCBG09CB | Computers for teaching science | 1.58 | 1.38 | 0.20 | |
| BCBG09CC | Software for teaching science | 1.42 | 1.42 | 0 | |
| BCBG09CD | Library resources for teaching science | 1.35 | 1.32 | 0.03 | |
| BCBG09CE | Audio-visual aids for teaching science | 1.19 | 1.75 | 0.56 | ✓ |
| BCBG09CF | Calculators for teaching science | 1.12 | 1.43 | 0.31 | ✓ |
| | How often does your school demand parents of the following? | | | | |
| BCBG10BA | Voluntary participation in projects ,programs and school trips. | 0.67 | 0.78 | 0.11 | |

| Item | Item | Average | | difference | significance level $\alpha = 0.05$ |
|----------|---|---------|------|------------|---------------------------------------|
| | | 2011 | 2007 | | |
| BCBG10BB | Joining school's committees | 0.81 | 0.45 | 0.36 | ✓ |
| | How do you evaluate the following? | | | | |
| BCBG11A | Teachers' satisfaction about their work | 2.68 | 2.86 | 0.18 | |
| BCBG11B | Teachers knowledge about curriculum objectives | 2.89 | 2.97 | 0.08 | |
| BCBG11C | Teachers' success in curriculum implementation | 3.05 | 3.10 | 0.05 | |
| BCBG11D | Teachers' expectations about students' performance | 2.57 | 2.72 | 0.15 | |
| BCBG11E | Parents' support towards students' performance | 2.03 | 2.13 | 0.10 | |
| BCBG11F | Parents' participation in school activities | 1.95 | 2.13 | 0.18 | |
| BCBG11G | Students' ability to keep the school equipment | 2.12 | 2.46 | 0.34 | ✓ |
| BCBG11H | students' willingness in hardworking | 2.36 | 2.65 | 0.29 | ✓ |
| | To what extent , are the following items considered a problem for the eighth grade students? | | | | |
| BCBG12AA | Late arrival to school | 1.09 | 1.40 | 0.31 | ✓ |
| BCBG12AB | Absence without an excuse | 1.28 | 1.32 | 0.04 | ✓ |
| BCBG12AC | Riots in the classrooms | 1.41 | 1.12 | 0.29 | ✓ |
| BCBG12AD | Cheating | 1.28 | 0.95 | 0.33 | ✓ |
| BCBG12AE | Insulting and abusing | 1.38 | 1.02 | 0.36 | ✓ |
| BCBG12AF | Destruction | 1.45 | 0.94 | 0.51 | ✓ |
| BCBG12AG | Robbery | 1.00 | 0.65 | 0.35 | ✓ |
| BCBG12AH | Threatening and verbal insulting among students (including written words , electronic mails) | 1.21 | 0.94 | 0.27 | ✓ |
| BCBG12AI | Physical abuse towards other students | 1.02 | 0.57 | 0.45 | ✓ |
| BCBG12AJ | Threatening , verbal abuse towards teachers and staff such as written words ,e-mails) | 0.81 | 0.38 | 0.43 | ✓ |
| BCBG12AK | Physical abuse towards teachers and staff | 0.72 | 0.15 | 0.57 | ✓ |
| | To what extent, do you consider one of the following is a problem? | | | | |
| BCBG12BA | Late arrival and early departure | 1.28 | 0.55 | 0.73 | ✓ |
| BCBG12BB | Absence | 1.67 | 0.77 | 0.90 | ✓ |
| | Does your school do any of the following to evaluate eighth grade teachers' performance in math ? | | | | |
| BCBG13A | Notes of school principal , principal assistant ,teacher. | 1.00 | 0.98 | 0.02 | |
| BCBG13B | Notes of supervisors and other people outside the school. | 0.95 | 0.98 | 0.03 | |
| BCBG13C | Students' achievement | 0.98 | 0.95 | 0.03 | |
| BCBG13D | Discussion with a colleague teacher | 0.77 | 0.77 | 0 | |
| | Does your school do any of the following to evaluate eighth grade teachers' performance in math ? | | | | |
| BCBG14A | Notes of school principal , principal assistant ,teacher. | 1.00 | 0.98 | 0.02 | |
| BCBG14B | Notes of supervisors and other people outside the school. | 0.94 | 0.97 | 0.03 | |
| BCBG14C | Students' achievement | 0.98 | 0.93 | 0.05 | ✓ |

| Item | Item | Average | | difference | significance level $\alpha = 0.05$ |
|---------|---|---------|------|------------|---------------------------------------|
| | | 2011 | 2007 | | |
| BCBG14D | Discussion with a colleague teacher | 0.77 | 0.80 | 0.03 | |
| | To what extent does the school have difficulty in filling job vacancies for teachers of eighth grade? | | | | |
| BCBG15A | Math | 0.96 | 1.15 | 0.19 | |
| BCBG15B | Science | 0.76 | 1.09 | 0.33 | ✓ |
| | Does your school give any incentives (rank allowance, accommodation, rewards , or smaller classes) to encourage teachers of eighth grade to continue teaching at school? | | | | |
| BCBG16A | Math | 0.15 | 0.19 | 0.04 | |
| BCBG16B | Science | 0.12 | 0.20 | 0.08 | |
| BCBG16C | Others | 0.25 | 0.24 | 0.01 | |

The differences in factors leading to the decline in 2011 in comparison with 2007 are as follows:

- The total number of eighth grade students.
- Audio-visual teaching aids for math.
- Calculators for teaching math.
- Audio-visual teaching aids for science.
- Calculators for teaching science.
- Students' attitudes towards preserving school facilities and equipment.
- Students' willingness in hardworking.
- Riots in the classroom.
- Cheating
- Insulting and abuse.
- Robbery
- Threatening and verbal abuse among students.
- Physical abuse towards other students.
- Threatening and verbal abuse towards teachers or staff including written words and e-mails.
- Physical abuse towards teachers and staff.
- Teachers' late arrival and early departure.
- Teachers' absence

The following factors for 2011 decline can be drawn through the school questionnaire which was filled by the school principal: The schools in 2011 were much more crowded than in 2007. The number of audio-visual aids as well as calculators for teaching math and science is very few in 2011. Students are also more careless towards school equipment and facilities in 2011 than in 2007. All other factors such as abuse , cheating , robbery ,riots, physical abuse have risen in 2011. Teachers' absence and their late arrival to schools and early departure to their homes has increased in 2011 compared to 2007.

2- Results of students' questionnaire

Common items of student's questionnaire in 2007 and in 2011 are identified. The averages of these common items were calculated the differences were tested using T-test for the independent samples. Table (16) shows the results of this test. The differences in 2011 which led to such a decline were in the following areas:

Table (128)
Results of student questionnaire in TIMSS 2007,2011

| Item | Item | Average | | Difference | Significance level $\alpha = 0.05$ |
|---------|--|---------|-------|------------|---------------------------------------|
| | | 2011 | 2007 | | |
| BSBG01 | Are you a male or female ? | 0.49 | 0.48 | 0.01 | |
| BSBG03 | How much Arabic do you speak at home? | 2.60 | 2.63 | 0.03 | |
| BSBG04 | How many books do you have at home apart from magazines, newspapers and school textbooks? | 56.22 | 62.24 | 6.02 | ✓ |
| | Do you have any of the following at home? | | | | ✓ |
| BSBG05A | Computer | 0.80 | 0.66 | 0.14 | ✓ |
| BSBG05C | A desk | 0.67 | 0.63 | 0.04 | ✓ |
| BSBG05E | Internet | 0.43 | 0.24 | 0.19 | ✓ |
| BSBG05F | Digital camera | 0.34 | 0.31 | 0.03 | ✓ |
| BSBG05G | An automatic washing machine | 0.65 | 0.69 | 0.04 | ✓ |
| BSBG05H | Central heating | 0.33 | 0.28 | 0.05 | ✓ |
| BSBG05I | Air condition | 0.43 | 0.32 | 0.11 | ✓ |
| BSBG06A | What is your mother's academic background or the one who plays her role in taking care of you? | 2.25 | 2.01 | 0.24 | ✓ |
| BSBG06B | What is your father's academic or the one who plays his role in taking care of you? | 2.39 | 2.14 | 0.25 | ✓ |
| BSBG07 | What is the highest academic level do you expect yourself to attain? | 3.53 | 3.58 | 0.05 | |
| | What is your opinion about your school? | | | | |
| BSBG12A | I like to be at school | 2.46 | 2.51 | 0.05 | |
| | How often do the following happen to you this year? | | | | |
| BSBG13A | Verbal insult | 0.32 | 0.12 | 0.2 | ✓ |
| BSBG13B | My colleagues exclude me from doing activities and playing | 0.26 | 0.14 | 0.12 | ✓ |
| BSBG13D | My properties are stolen | 0.28 | 0.19 | 0.09 | ✓ |
| BSBG13E | Being hit , injured by other students | 0.18 | 0.11 | 0.07 | ✓ |
| BSBG13F | Students forced me to do things I don't want to do | 0.11 | 0.52 | 0.41 | ✓ |
| | Regarding math, do you agree with the following ?to what extent? | | | | |
| BSBM14A | I find it exciting to learn math | 2.32 | 2.34 | 0.02 | |
| BSBM14C | Learning math is boring | 1.06 | 0.96 | 0.10 | ✓ |
| BSBM14E | I like math | 2.22 | 2.27 | 0.05 | |
| | Regarding math, do you agree with the following ?to | | | | |

| Item | Item | Average | | Difference | Significance level $\alpha = 0.05$ |
|---------|---|---------|-------|------------|---------------------------------------|
| | | 2011 | 2007 | | |
| | what extent? | | | | |
| BSBM16A | I do very well in math | 2.49 | 2.15 | 0.34 | ✓ |
| BSBM16B | Learning math is more difficult for me than my colleagues | 1.52 | 1.34 | 0.18 | ✓ |
| BSBM16C | I am not so good at math | 1.50 | 1.04 | 0.46 | ✓ |
| BSBM16D | I learn math quickly | 2.26 | 2.10 | 0.16 | ✓ |
| BSBM16J | Learning math will help me in my everyday life | 2.67 | 2.70 | 0.03 | ✓ |
| BSBM16K | I have to learn math in order to understand other subjects | 2.52 | 2.51 | 0.01 | ✓ |
| BSBM16L | I have to do very well at math in order to join university | 2.72 | 2.65 | 0.07 | ✓ |
| BSBM16M | I have to do very well at math in order to access the job I want | 2.62 | 2.55 | 0.07 | ✓ |
| | Regarding science, do you agree with the following ?to what extent? | | | | |
| BSBS17F | I like science | 2.45 | 2.42 | 0.03 | |
| | Regarding science, do you agree with the following ?to what extent? | | | | |
| BSBS19A | I do very well in science | 2.61 | 2.52 | 0.09 | ✓ |
| BSBS19B | Learning science is more difficult for me than my colleagues | 1.32 | 2.61 | 1.29 | ✓ |
| BSBS19C | I am not so good at science | 1.37 | 0.91 | 0.46 | ✓ |
| BSBS19D | I learn science quickly | 2.42 | 2.22 | 0.20 | ✓ |
| BSBS19J | Learning science will help me in my everyday life | 2.69 | 2.64 | 0.05 | ✓ |
| BSBS19K | I have to learn science in order to understand other subjects | 2.49 | 2.43 | 0.06 | |
| BSBS19L | I have to do very well at science in order to join university | 2.60 | 2.56 | 0.04 | |
| BSBS19M | I have to do very well at science in order to access the job I want | 2.50 | 2.48 | 0.02 | |
| BSBM20A | How much math homework does your teacher demand you? | 3.15 | 3.30 | 0.15 | |
| BSBM20B | Once your math teacher assign you a homework, how much time do you spend for doing it? | 24.60 | 30.94 | 6.34 | ✓ |
| BSBS21A | How much science homework does your teacher demand you? | 2.67 | 2.96 | 0.29 | ✓ |
| BSBS21B | Once your science teacher assign you a homework, how much time do you spend for doing it? | 24.52 | 30.32 | 5.8 | ✓ |

Domains of decline according to student's questionnaire:

- The number of books available at student's home.
- A desk or table for studying.
- An automatic washing machine at student's house.
- The highest academic level student expect to attain.
- Verbal insult.
- Being excluded from playing and doing activities.
- Student's properties are stolen.
- Being hit or injured by other classmates.
- Learning math is boring.
- Students' attitudes and motivation for learning math.
- Learning math is more difficult for me than my colleagues.
- Being not so good at math.
- Learning math will help students in their daily life.
- Being not so good at science.
- The time allocated for doing math homework.
- The number of science homework given to students.
- The time allocated for doing science homework.

The data concluded from student's questionnaire which was filled out by eighth grade students revealed the factors that witnessed actual change in 2011 in comparison with 2007 as follows: In 2011, the existence of books, desks, and an automatic washing machine were less than in 2007.

Students in 2011 are less ambitious than students of 2007 as revealed in their expectations of their highest levels of education.

3- Results of math teacher questionnaire.

The common items of teacher's questionnaire in 2007 and in 2011 were identified, and the averages of the common items were calculated using T-test for the independent samples. Table (17) shows the results of this test. The real differences in 2011 which led to such a decline were in the following areas:

- Teacher's major specialization: education- math.
- Cooperation with teachers in planning and preparing for school subjects.
- Parents' participation in school activities.
- Students' respect of school equipment.
- Students' success at school.
- The safety of school location.
- Feeling secured at school.
- Overcrowded classrooms.
- The lack of convenient workplace (planning for lessons ,cooperation and meetings).
- The number of students per section.

- Naughty students.
- Careless students.
- Integrating what they learn to their daily life.
- Identifying teacher's own method in solving complex exercises.
- How many exams are done in the field of math ?
- Questions that need special mathematical procedures.
- In the last two years, did the teacher participate in professional development in the field of mathematical content?
- In the last two years, did the teacher participate in professional development in the field of math teaching methods?
- In the last two years, did the teacher participate in professional development in the field of math curriculum?
- In the last two years, did the teacher participate in professional development in the field of integrating technology and math?
- In the last two years, did the teacher participate in professional development in the field of improving critical thinking?
- In the last two years, did the teacher participate in professional development in the field of math assessment?
- Readiness towards teaching the relation between the 3-D shapes and representing them in a two-dimensional ones.

Table (129)
Results of math teacher questionnaire in TIMSS 2007,2011

| Item | Item | Average | | Difference | Function level $\alpha = 0.05$ |
|---------|---|---------|-------|------------|-----------------------------------|
| | | 2011 | 2007 | | |
| BTBG01 | How long have you been working as a teacher? | 9.91 | 10.56 | 0.65 | |
| BTBG02 | Are you a male or female? | 0.51 | 0.52 | 0.01 | |
| BTBG03 | How old are you ? | 36.68 | 34.83 | 1.85 | |
| BTBG04 | What is the highest educational level you have attained through formal education? | 3.85 | 3.91 | 0.06 | |
| | What is your major at university ? | | | | |
| BTBG05A | Math | 0.89 | 0.86 | 0.03 | |
| BTBG05F | Educational – math | 0.18 | 0.44 | 0.26 | ✓ |
| BTBG05G | Educational – science | 0.02 | 0.03 | 0.01 | |
| BTBG05H | Educational – general | 0.04 | 0.21 | 0.17 | ✓ |

| | | | | | |
|---------|---|------|------|------|---|
| BTBG05I | Other majors | 0.05 | 0.18 | 0.13 | ✓ |
| | How do you evaluate the following? | | | | |
| BTBG06A | Teachers' satisfaction about their work | 2.66 | 2.61 | 0.05 | |
| BTBG06B | Teachers' recognition of the curriculum objectives | 3.08 | 2.91 | 0.17 | ✓ |
| BTBG06C | Degree of students' success in implementing school curriculum | 2.99 | 2.87 | 0.12 | |
| BTBG06D | Teachers' expectations about students' attainment | 2.58 | 2.54 | 0.04 | |
| BTBG06E | Parental support in school activities | 1.73 | 1.63 | 0.10 | |
| BTBG06F | Parental participation in school activities | 1.54 | 1.30 | 0.24 | ✓ |
| BTBG06G | Students' respect for school property | 1.95 | 1.71 | 0.24 | ✓ |
| BTBG06H | Students' desire towards success | 2.43 | 1.95 | 0.48 | ✓ |
| | According to your current school situation , do you agree or disagree towards the following? | | | | |
| BTBG07A | The school is located in a safe area | 2.49 | 2.31 | 0.18 | ✓ |
| BTBG07B | I feel secured in school | 2.58 | 2.34 | 0.24 | ✓ |
| BTBG07C | Security procedures at school | 2.23 | 2.17 | 0.06 | |
| | In your current school, what is the degree of seriousness towards the following problems? | | | | |
| BTBG08A | The school building needs maintenance | 0.72 | 0.75 | 0.03 | |
| BTBG08B | Overcrowded classrooms | 1.01 | 1.25 | 0.24 | ✓ |
| BTBG08D | The lack of convenient workplace (planning for lessons ,cooperation and meetings). | 0.90 | 1.21 | 0.31 | ✓ |
| | What kind of interaction is there among teachers? | | | | |
| BTBG10A | Discussing how to teach a certain topic. | 1.33 | 1.49 | 0.16 | |
| BTBG10B | Cooperation in planning , and preparing educational materials. | 1.07 | 1.33 | 0.26 | ✓ |
| BTBG10D | Class visits to exchange experiences in teaching | 0.84 | 0.90 | 0.06 | |

| | | | | | |
|----------|--|-------|-------|------|---|
| BTBG12 | The number of students in the classroom | 35.38 | 32.99 | 2.39 | ✓ |
| | In your opinion, to what extent do the factors hinder the teaching method for this section? | 1.83 | 1.78 | 0.05 | |
| BTBG15D | Special needs students whether physical ,mental or psychological disability | 1.93 | 1.97 | 0.04 | |
| BTBG15E | Naughty students | 1.94 | 1.97 | 0.03 | |
| BTBG15F | Careless students | 1.95 | 1.94 | 0.01 | |
| | Since you are teaching math for this section, how often do you have to repeat the following? | | | | |
| BTBM19F | Applying facts, concepts, and procedures to solve mathematical problems. | 1.88 | 1.89 | 0.01 | |
| BTBM19G | Give proper explanations for mathematical exercises | 1.84 | 1.93 | 0.09 | |
| BTBM19H | Integrating what they learn to their daily life. | 1.73 | 1.59 | 0.14 | ✓ |
| BTBM19I | Identifying their own method in solving problems. | 1.89 | 1.93 | 0.04 | |
| BTBM19J | Solving problems that have no direct clear method. | 1.96 | 1.94 | 0.02 | |
| BTBM21A | Are students allowed to use the calculator? | 1.80 | 1.74 | 0.06 | |
| | How often do students use the calculator in doing the following activities? | | | | |
| BTBM21BA | Checking the answers | 1.83 | 1.93 | 0.10 | ✓ |
| BTBM21BB | Doing mathematical calculations | 1.84 | 1.79 | 0.05 | |
| BTBM21BC | Doing complicated mathematical calculations | 1.77 | 1.77 | 0 | |
| BTBM21BD | Recognizing concepts related to numbers | 1.83 | 1.78 | 0.05 | |
| | How often do you ask your students to use computers during math lessons? | 1.93 | 1.97 | 0.04 | |
| BTBM22CA | Discovering mathematical concepts and principles | 1.94 | 1.97 | 0.03 | |
| BTBM22CB | Practicing skills and procedures | 1.95 | 1.94 | 0.01 | |
| BTBM22CC | Searching for ideas and information | | | | |
| BTBM22CD | Processing and analyzing data | 1.88 | 1.89 | 0.01 | |

| | | | | | |
|----------|---|------|------|------|---|
| | The following list consist of the main topics in TIMMS (math).Choose the item that has been fully taught at school . In case the item has been taught before eighth grade or part of it has been taught in the first semester choose “it has been taught before” . If the topics are not included yet in the curricula choose “it has not been taught yet or it has not been included yet”. | | | | |
| | Numbers | | | | |
| BTBM23AA | Doing calculations on integer numbers and rounding them . | | | | |
| BTBM23AB | Concepts related to common fractions and the basic relevant calculations | 1.73 | 1.59 | 0.14 | ✓ |
| BTBM23AC | Concepts related to decimal fractions and the basic relevant calculations | 1.89 | 1.93 | 0.04 | |
| BTBM23AD | Natural numbers representation ,comparing and ordering them | 1.96 | 1.94 | 0.02 | |
| | Algebra | 1.80 | 1.74 | 0.06 | |
| BTBM23BA | Numerical , geometric , algebraic patterns and progression | | | | ✓ |
| BTBM23BB | Simplifying and calculating algebraic expressions | 1.39 | 1.07 | 0.32 | ✓ |
| BTBM23BC | Linear equations and inequalities | 1.35 | 1.21 | 0.14 | ✓ |
| BTBM23BE | Representing functions in different ways. | 1.28 | 1.03 | 0.25 | ✓ |
| | Geometry | | | | |
| BTBM23CB | Angles’ and geometric shapes’ properties | 1.33 | 1.57 | 0.24 | ✓ |
| BTBM23CC | Congruent triangles and similar triangles | 0.72 | 0.81 | 0.09 | |
| BTBM23CE | Representing points on Cartesian plane | 1.69 | 1.02 | 0.67 | ✓ |
| BTBM23CF | Rotation , reflection , translation | 1.58 | 0.42 | 1.16 | ✓ |
| | Data and probabilities | | | | |
| BTBM23DA | Representing data in tables, diagrams, bars, etc. | 1.70 | 1.38 | 0.32 | ✓ |
| BTBM23DB | Interpreting data such as coming up with | 1.20 | 0.74 | 0.46 | ✓ |

| | | | | | |
|----------|---|------|------|------|---|
| | conclusions | | | | |
| BTBM23DC | Guessing the probabilities of results | 1.33 | 0.59 | 0.74 | ✓ |
| | What about the time allocated in percentage for each topic? | | | | |
| BTBM24A | Numbers including: integer , common fractions, percentage , decimal fractions , Ratios and proportions | 26.0 | 24.9 | 1.1 | |
| BTBM24B | Algebra (equation , patterns, functions) | 25.9 | 27.0 | 1.1 | |
| BTBM24C | Geometry (angles, shapes, etc.) | 22.6 | 21.9 | 0.7 | |
| BTBM24D | Data and probabilities (organizing data and representing them) | 16.0 | 13.1 | 2.91 | ✓ |
| BTBM24E | Other topics | 9.5 | 13.2 | 3.7 | ✓ |
| | To what extent do you use the following resources to follow up students' progress in math | | | | |
| BTBM26A | Ongoing assessment for students | 1.67 | 1.62 | 0.05 | |
| BTBM26B | Teacher- made classroom tests and readymade tests in the textbook | 1.71 | 1.75 | 0.04 | |
| BTBM26C | National and regional attainment tests | 1.38 | 1.25 | 0.13 | |
| BTBM27 | How often do you test your students in math? | 2.56 | 3.00 | 0.44 | ✓ |
| | Questions depending on memorizing procedures | | | | |
| BTBM28A | Questions depending on implementing mathematical procedures | 1.41 | 1.51 | 0.10 | |
| BTBM28B | Questions depending on finding out patterns and relations | 1.75 | 1.87 | 0.12 | ✓ |
| BTBM28C | Questions depending on justification and explanation | 1.21 | 1.21 | 0 | |
| BTBM28D | Did you participate in professional development in the last two years ? | 1.25 | 0.98 | 0.27 | ✓ |
| | Math content | | | | |

| | | | | | |
|----------|---|------|------|------|---|
| BTBM29A | Math teaching methods | 0.24 | 0.57 | 0.33 | ✓ |
| BTBM29B | Math curriculum | 0.36 | 0.78 | 0.42 | ✓ |
| BTBM29C | Integrating ICT in math | 0.20 | 0.62 | 0.42 | ✓ |
| BTBM29D | Improving critical thinking and problem solving skills | 0.38 | 0.65 | 0.27 | ✓ |
| BTBM29E | Math assessment | 0.40 | 0.67 | 0.27 | ✓ |
| | Are you ready to teach the following topics? In case the topic is not included in the 8 th grade curriculum or if you are not responsible for teaching the topic choose “inapplicable” | | | | |
| | Numbers | | | | |
| BTBM30AA | Doing calculations on integer numbers and rounding them . | 1.89 | 1.94 | 0.05 | |
| BTBM30AE | Solving exercises on percentages and ratio and proportion | 1.85 | 1.90 | 0.05 | |
| | Algebra | | | | |
| BTBM30BA | Numerical , geometric , algebraic patterns and progression | 1.83 | 1.78 | 0.05 | |
| BTBM30BB | Simplifying and calculating algebraic expressions | 1.93 | 1.97 | 0.04 | |
| BTBM30BD | Simultaneous linear equations | 1.94 | 1.97 | 0.03 | |
| BTBM30BE | Representing functions in different ways. | 1.95 | 1.94 | 0.01 | |
| | Geometry | | | | |
| BTBM30CA | Angles’ and geometric shapes’ properties | 1.88 | 1.89 | 0.01 | |
| BTBM30CB | Congruent triangles and similar triangles | 1.84 | 1.93 | 0.09 | |
| BTBM30CC | Representing points on Cartesian plane | 1.73 | 1.59 | 0.14 | ✓ |
| BTBM30CD | Using suitable measuring tools in calculating circumference and size of shapes | 1.89 | 1.93 | 0.04 | |
| BTBM30CE | Identifying points on Cartesian plane | 1.96 | 1.94 | 0.02 | |
| BTBM30CF | Rotation , reflection , translation | 1.80 | 1.74 | 0.06 | |

| | | | | | |
|----------|--|------|------|------|---|
| | Data and probabilities | | | | |
| BTBM30DA | Representing data in tables, diagrams, bars, etc. | 1.83 | 1.93 | 0.10 | ✓ |
| BTBM30DB | Interpreting data such as coming up with conclusions | 1.84 | 1.79 | 0.05 | |
| BTBM30DC | Guessing the probabilities of results | 1.77 | 1.77 | 0 | |

The data included in the questionnaire which was filled by eighth grade Math teachers who participated in the study, revealed the following factors as causes of decline in 2011 compared with 2007, and these factors can be summarized as follows:

- Math teachers in 2011 were less qualified compared with their peers in 2007.
- Low degree of cooperation among Math teachers in the domains of planning and selection of teaching materials in 2011 compared with level of cooperation among their peers in 2007.
- Decline in parents' participation in school activities in 2011 compared with the level of their participation in 2007.
- Lack of students' loyalty to maintain school properties in 2011 compared with their loyalty in 2007.
- Decrease in students' interest and willingness to succeed in their study in 2011 compared with the level of their interest in 2007.
- High rate of schools situated in unsafe regions in 2011 compared with 2007, as well as the teachers' feeling of insecurity in these schools.
- Overcrowded classrooms and inconvenient work environment for teachers in 2011 compared with 2007.
- Increase in the number of students in the eighth grade in 2011 compared with 2007.
- High percentage of tiresome and careless students in 2011 compared with 2007.
- Math teachers in 2011 do not emphasize the correlation between Math and the real life situations and they do not focus on Math applications compared with their peers in 2007.
- Low participation of Math teachers in professional development in the content of this subject besides the poor utilization of teaching methods and techniques and inclusion of ICT in teaching Math compared with their peers in 2007.
- Lack of teachers' interest in enhancing students' critical thinking and assessing their learning achievement.

4- Results of the Science Teacher Questionnaire

The common items in 2007 and in 2011 were identified and the averages were calculated for all items. The difference between the two averages for every item in 2007 and in 2011 was calculated as well as the statistical significance for these differences using T test for the independent samples.

Table (18) shows the results of this analysis. The differences leading to this decline in 2011 compared to 2007 were in the following domains:

- Teachers' awareness of the curricula objectives as approved by your school.
- Level of teachers' ability to apply approved curricula.
- Students' loyalty to maintain school properties.
- Students' willingness to study and succeed.
- Location of the school in a safe region.
- Feeling safe in the school.
- Lack of convenient work environment for teachers (to prepare for the lessons or to hold meetings).
- Discussing how to teach a specific subject.
- Cooperating in planning and selecting teaching materials.
- How many students are in this section?
- Watching natural scenery and describe what they see.
- Preparing experiments and conducting research.
- Urging students to memorize mathematical facts and principles.
- Using scientific formulas and rules to solve ordinary mathematical problems.
- Providing explanations for mathematical problems.
- Linking what the students learn with the real and daily life.
- Do students in this section use computer/computers during Science lessons?
- Making scientific experiments.
- Continuous assessment of students' work.
- Classroom tests.
- Professional development in the content domain.
- Professional development regarding teaching methods and techniques.
- Professional development regarding ICT utilization.
- Professional development to enhance students' critical thinking and upgrade their research skills.
- Professional development in the domain of assessing Science subject.

Table (130)
Results of the Science Teacher Questionnaire in (2007-2011) in TIMSS

| Item Code | | Average | | Difference | Significance Level $\alpha=0.05$ |
|-----------|---|---------|-------|------------|-------------------------------------|
| | | 2011 | 2007 | | |
| BTBG01 | How long have you been working as a teacher? | 8.97 | 7.92 | 1.05 | |
| BTBG02 | Are you a male or female? | 0.56 | 0.53 | 0.03 | |
| BTBG03 | How old are you? | 33.47 | 33.66 | 0.19 | |
| BTBG04 | What is the highest educational level you have attained through formal education? | 4.03 | 4.00 | 0.03 | |

| | | | | | |
|---------|--|------|------|------|---|
| | What is your major at university? | | | | |
| BTBG05A | Math | 0.07 | 0.53 | 0.46 | ✓ |
| BTBG05B | Biology | 0.24 | 0.52 | 0.28 | ✓ |
| BTBG05C | Physics | 0.38 | 0.65 | 0.27 | ✓ |
| BTBG05D | Chemistry | 0.26 | 0.62 | 0.36 | ✓ |
| BTBG05E | Geology | 0.15 | 0.36 | 0.21 | ✓ |
| BTBG05F | Educational-Math | 0.02 | 0.06 | 0.04 | |
| BTBG05G | Educational-Science | 0.27 | 0.37 | 0.10 | |
| BTBG05H | Educational-General | 0.04 | 0.20 | 0.16 | ✓ |
| BTBG05I | Other Majors | 0.07 | 0.16 | 0.09 | ✓ |
| | How do you evaluate the following? | | | | |
| BTBG06A | Teachers' satisfaction about their work | 2.63 | 2.50 | 0.13 | |
| BTBG06B | Teachers' recognition of the curriculum objectives | 2.79 | 3.02 | 0.23 | ✓ |
| BTBG06C | Degree of students' success in implementing school curriculum | 2.76 | 2.98 | 0.22 | ✓ |
| BTBG06D | Teachers' expectations about students' attainment | 2.52 | 2.62 | 0.10 | |
| BTBG06E | Parental support in school activities | 1.65 | 1.84 | 0.19 | |
| BTBG06F | Parental participation in school activities | 1.43 | 1.61 | 0.18 | |
| BTBG06G | Students' respect for school property | 1.70 | 2.03 | 0.33 | ✓ |
| BTBG06H | Students' desire towards success | 2.02 | 2.51 | 0.49 | ✓ |
| | According to your current school situation , do you agree or disagree towards the following? | | | | |
| BTBG07A | The school is located in a safe area | 2.21 | 2.41 | 0.2 | ✓ |
| BTBG07B | I feel secured in school | 2.33 | 2.57 | 0.24 | ✓ |
| BTBG07C | Security procedures at school | 2.13 | 2.22 | 0.09 | |
| | In your current school, what is the degree of seriousness towards the following problems? | | | | |
| BTBG08A | The school building needs maintenance | 0.71 | 0.74 | 0.03 | |

| | | | | | |
|---------|---|-------|-------|------|---|
| BTBG08B | Overcrowded classrooms | 1.16 | 1.09 | 0.07 | |
| BTBG08D | The lack of convenient workplace (planning for lessons ,cooperation and meetings). | 1.10 | 0.94 | 0.16 | ✓ |
| | What kind of interaction among teachers? | | | | |
| BTBG10A | Discussing how to teach a certain topic? | 1.62 | 1.40 | 0.22 | ✓ |
| BTBG10B | Cooperation in planning, and preparing educational materials? | 1.72 | 1.16 | 0.56 | ✓ |
| BTBG10D | Class visits to exchange experiences in teaching | 0.74 | 0.86 | 0.12 | |
| BTBG12 | The number of students in the classroom | 35.37 | 33.13 | 2.24 | ✓ |
| | In your opinion, to what extent do the factors hinder the teaching method for this section? | | | | |
| BTBG15D | Students with special needs(such as physical and mental disabilities, psychological disorders). | 0.84 | 0.89 | 0.05 | |
| BTBG15E | Tiresome and troublesome students | 1.09 | 1.05 | 0.04 | |
| BTBG15F | Careless students | 1.16 | 1.16 | 0 | |
| | To what extent do you usually ask students to do the following during Science lessons? | | | | |
| BTBS19A | Watch natural phenomenon and describe what they see. | 1.68 | 2.14 | 0.46 | ✓ |
| BTBS19B | Watch you while you are explaining an experiment or how to make a research. | 2.24 | 2.29 | 0.05 | |
| BTBS19C | Prepare to make an experiment or a research. | 1.73 | 1.44 | 0.29 | ✓ |
| BTBS19D | Make experiments or researches. | 1.76 | 1.74 | 0.02 | |
| BTBS19E | Read textbooks or other learning resources. | 1.89 | 1.95 | 0.06 | |
| BTBS19F | Ask students to memorize facts and principles. | 2.19 | 2.63 | 0.44 | ✓ |
| BTBS19G | Use scientific formulas and rules to solve ordinary problems. | 2.23 | 2.64 | 0.41 | ✓ |
| BTBS19H | Provide explanations for problems. | 2.13 | 2.69 | 0.56 | ✓ |
| BTBS19I | Link what they learn with real life situations. | 2.42 | 2.73 | 0.31 | ✓ |
| BTBS21A | Are computers available for utilization during Science lessons? | 0.82 | 0.51 | 0.31 | ✓ |

| | | | | | |
|----------|---|------|------|------|---|
| BTBS21B | Is a computer linked to the Internet. | 0.93 | 0.77 | 0.16 | |
| | How many times do you ask students to do their activities on the computer during Science lessons? | | | | |
| BTBS21CA | Do exercises related to skills and procedures. | 1.38 | 1.22 | 0.16 | |
| BTBS21CB | Look for ideas and information. | 1.82 | 1.65 | 0.17 | |
| BTBS21CC | Do scientific experiments. | 1.15 | 1.52 | 0.37 | ✓ |
| BTBS21CD | Study natural phenomenon through simulation. | 1.34 | 1.15 | 0.19 | |
| BTBS21CE | Data processing and analysis. | 1.16 | 1.33 | 0.17 | |
| | Choose the answer that relates to the time allocated for each subject, and if this subject was part of the school textbook before the eighth grade, answer: it was taught before this year". If the subject was taught during the first semester, answer "most of it was taught this year" and if it was introduced after that, answer "it has not been taught yet or included recently". | | | | |
| | Biology | | | | |
| BTBS22AA | Body organs(structure, function and stable health of the body). | 1.58 | 1.42 | 0.16 | |
| BTBS22AB | Cells and their functions, including respiration and photosynthesis as related to cells' operations. | 1.57 | 1.18 | 0.39 | ✓ |
| BTBS22AC | Reproduction (sexual and asexual) and genetics (inherited characteristics and traits compared with acquired /learned characteristics). | 1.42 | 1.18 | 0.24 | ✓ |
| | Chemistry | | | | |
| BTBS22BA | Matter classifications, its composition and structure (elements, compounds, mixtures, molecules, atoms, protons, neutrons and electrons). | 1.33 | 1.40 | 0.07 | |
| BTBS22BB | Solutions (solvent soluble material, concentration of the substance and mitigating the effect of temperature on the solubility). | 1.44 | 1.32 | 0.12 | |
| BTBS22BC | Characteristics of common Acid and Base solutions . | 1.26 | 0.95 | 0.31 | ✓ |
| BTBS22BD | Chemical transformation (material interaction, evidence of chemical transformation, maintaining the matter and | 1.29 | 1.18 | 0.11 | |

| | | | | | |
|----------|---|------|------|------|---|
| | common oxidation reactions - such as combustion, rust and pollution). | | | | |
| | Physics | | | | |
| BTBS22CA | Physical states of the matter and related transformation relating thereto (characteristics regarding atoms' motion and the distance between them , the transformation of the state , thermal expansion and other changes in the size and / or pressure. | 1.36 | 1.37 | 0.01 | |
| BTBS22CB | Forms and transformations of energy and transformations, temperature and its degrees. | 1.49 | 1.19 | 0.3 | ✓ |
| BTBS22CC | Characteristics and traits of light (reflection and refraction of light , colors and graphic of simple radiation) and sound (traveling through media and sound module, degree and its frequency and speed). | 1.11 | 1.13 | 0.02 | |
| BTBS22CD | Electric circuit (current flow, types of circuits, and the relationship between the current / voltage) and the characteristics of the permanent magnets and electric magnets and methods of utilization. | 0.91 | 1.04 | 0.13 | ✓ |
| BTBS22CE | Powers and motion (types of powers and a basic description of the motion and the effects of density and pressure). | 1.30 | 1.10 | 0.2 | ✓ |
| | Geology | | | | |
| BTBS22DA | Structure and its topography (the earth's crust, nucleus and water formation, percentage of its distribution and air composition). | 1.37 | 1.17 | 0.2 | ✓ |
| | By the end of this year, what is the percentage of time allocated to teach this section for all topics related to Science content? | | | | |
| BTBS23A | Biology (such as structure / function, life developments, breeding / genetics, natural evolution , ecosystems and human health). | 22.6 | 20.7 | 1.9 | ✓ |
| BTBS23B | Chemistry (such as matter classification and characteristics of chemical transformation). | 24.9 | 26.5 | 1.6 | |
| BTBS23C | Physics (such as natural states/matter transformation, light, sound, electricity and magnetism, powers and motion). | 30.0 | 30.7 | 0.7 | |

| | | | | | |
|---------|---|------|------|------|---|
| BTBS23D | Biology (such as the structure of the earth , evolution and resources, the solar system and the universe). | 16.5 | 15.8 | 0.7 | |
| BTBS23E | Other topics | 5.8 | 6.3 | 0.5 | |
| | To what extent do you focus on the following to follow up students' progress in learning Science? | | | | |
| BTBS25A | Continuous evaluation of students' work. | 1.50 | 1.68 | 0.18 | ✓ |
| BTBS25B | Classroom tests (prepared by teachers or included in textbooks). | 1.66 | 1.80 | 0.14 | ✓ |
| BTBS25C | National /regional tests relating to students' achievement. | 1.35 | 1.37 | 0.02 | |
| BTBS26 | How many times do you make Science tests for this section? | 2.52 | 2.90 | 0.38 | ✓ |
| | How many times do you include the following questions in Science tests? | | | | |
| BTBS27A | Questions based on recognizing concepts and facts. | 1.65 | 1.56 | 0.09 | |
| BTBS27B | Questions based on implementation of knowledge and understanding. | 1.79 | 1.71 | 0.08 | |
| BTBS27C | Question restricted to hypothesis and design of scientific research. | 1.00 | 0.90 | 0.10 | |
| BTBS27D | Questions based on explanations and justifications. | 1.43 | 1.27 | 0.16 | ✓ |
| | Have you participated in professional development in one of the following domains over the last two years? | | | | |
| BTBS28A | Science content. | 0.25 | 0.58 | 0.33 | ✓ |
| BTBS28B | Education/ Methods of teaching Science. | 0.42 | 0.78 | 0.36 | ✓ |
| BTBS28C | Syllabus of Science. | 0.25 | 0.66 | 0.41 | ✓ |
| BTBS28D | ICT inclusion in Science. | 0.32 | 0.59 | 0.27 | ✓ |
| BTBS28E | Development students' critical thinking and their research skills. | 0.50 | 0.74 | 0.24 | ✓ |
| BTBS28F | Assessment of Science content. | 0.33 | 0.54 | 0.21 | ✓ |
| | Are you prepared to teach the following topics related to Science? If this topic is not part of the eighth grade | | | | |

| | | | | | |
|----------|---|------|------|------|---|
| | syllabus or if you are not responsible for teaching this topic, answer "inapplicable". | | | | |
| | Biology | | | | |
| BTBS29AA | Body organs(structure, function and stable health of the body). | 1.64 | 1.77 | 0.13 | ✓ |
| BTBS29AB | Cells and their functions, including respiration and photosynthesis as related to cells' operations. | 1.65 | 1.78 | 0.13 | ✓ |
| BTBS29AC | Reproduction (sexual and asexual) and genetics (inherited characteristics and traits compared with acquired /learned characteristics). | 1.63 | 1.81 | 0.18 | ✓ |
| | Chemistry | | | | |
| BTBS29BA | Matter classifications, its composition and structure (elements, compounds, mixtures, molecules, atoms, protons, neutrons and electrons). | 1.85 | 1.77 | 0.08 | |
| BTBS29BB | Solutions (solvent soluble material, concentration of the substance and mitigating the effect of temperature on the solubility). | 1.77 | 1.68 | 0.09 | |
| BTBS29BC | Characteristics of common Acid and Base solutions . | 1.55 | 1.79 | 0.24 | ✓ |
| BTBS29BD | Chemical transformation (material interaction, evidence of chemical transformation, maintaining the matter and common oxidation reactions - such as combustion, rust and pollution). | 1.81 | 1.76 | 0.05 | |
| | Physics | | | | |
| BTBS29CA | Physical states of the matter and related transformation relating thereto (characteristics regarding atoms' motion and the distance between them , the transformation of the state , thermal expansion and other changes in the size and / or pressure. | 1.75 | 1.77 | 0.02 | |
| BTBS29CB | Forms and transformations of energy and transformations, temperature and its degrees. | 1.78 | 1.81 | 0.03 | |
| BTBS29CC | Characteristics and traits of light (reflection and refraction of light , colors and graphic of simple radiation) and sound (traveling through media and sound module, degree and its frequency and speed). | 1.75 | 1.67 | 0.08 | |

| | | | | | |
|----------|--|------|------|------|---|
| BTBS29CD | Electric circuit (current flow, types of circuits, and the relationship between the current / voltage) and the characteristics of the permanent magnets and electric magnets and methods of utilization. | 1.69 | 1.67 | 0.02 | |
| BTBS29CE | Powers and motion (types of powers and a basic description of the motion and the effects of density and pressure). | 1.75 | 1.64 | 0.11 | |
| | Geology | | | | |
| BTBS29DA | Structure and its topography (the earth's crust, nucleus and water formation, percentage of its distribution and air composition). | 1.46 | 1.78 | 0.32 | ✓ |
| BTBS29DD | The Earth as part of the solar system and the universe (natural phenomenon, the day, the night, the lunar eclipse , seasons and the Earth's natural characteristics compared with other objects and the sun as a star. | 1.54 | 1.67 | 0.13 | ✓ |

The data provided by the questionnaire filled by eighth grade Science teachers who participated in the study, revealed the following factors as causes of decline in 2011 compared with 2007, and these factors can be summarized as follows:

- The understanding of the Science teachers of the objectives of the subject curricula in 2011 was low compared with their peers in 2007.
- Science teachers in 2011 also were less successful than their peers in 2007 in the applications of school curricula.
- Students in 2011 were less loyal to maintain school properties compared with 2007, and their interest to succeed in school was also less than their colleagues in 2007.
- Schools in 2011 were less safe compared with the situation in 2007, and teachers of Science said they felt insecure in 2011 compared with 2007.
- Teachers in 2011 work in less convenient location compared with 2007, and the level of cooperation among them was low compared with 2007.
- Overcrowded classrooms in 2011 compared with 2007.
- Teachers in 2011 do not give students the opportunity to: watch natural scenery compared with 2007, conduct experiments and research, participate in problem solving, and link what they learn with real life style.
- Utilization of computers in Science lessons was low in 2011 compared with 2007.
- Science teachers in 2011 do not focus on continuous assessment of students' work and they are less interested in conducting class tests compared with their colleagues in 2007.
- Low rate of teachers' participation over the last two years in training courses related to professional development in the domain of content and teaching methods, ICT inclusion in teaching, enhancing critical thinking, and students' assessment.

Derived Variables

TIMSS study derived new standards based on a set of items, and these indicators or benchmarks are characterized by a higher degree of validity and reliability compared with the constituent items. The common indicators between 2007, 2011 were identified, and the averages of all indicators were calculated. The difference between the two averages for each indicator was also calculated in 2007 and in 2011 as well as the statistical significance of these differences using T-test for independent samples. Table (19) shows the results of this analysis. The differences leading to the decline in 2011 compared with 2007, and this applies to the following:

- Time spent by students to do their Math homework.
- Time spent by students to do their Science homework.
- The number of hours devoted to teaching Science in one scholastic year.
- Cooperation among Math teachers to improve and upgrade education.
- The feeling of safety and security and the school system from the viewpoint of a Math teacher.
- Teachers' willingness to teach data from the viewpoint of a Math teacher.
- The number of hours devoted to teaching Math in one scholastic year.
- Cooperation among science teachers to improve and upgrade education.
- The feeling of safety and security and the school system from the viewpoint of a Science teacher.
- The number of hours devoted to teaching Science in one scholastic year.

The derived indicators provided by the study suggest the following causes as difference factors in 2011 compared with 2007, and they can be summarized as follows:

- Students spend less time in doing their Math and Science homework in 2011 compared with 2007.
- The number of hours devoted to teach Math and Science in 2011 was less than hours allocated to these subjects in 2007.
- The degree of cooperation among Math and Science teachers in 2011 was less than the degree of cooperation among them in 2007.
- It seems that the school environment from the point of view of Science and Math teachers of the eighth grade was safer in 2007 compared with 2011.

Table (131)
Derived Variables for 2007-2011 in TIMSS

| Variable Name | Variable Table | Average | | Difference | Significance $\alpha = 0.05$ |
|-------------------------------|--|---------|---------|------------|---------------------------------|
| | | 2007 | 2011 | | |
| Student Questionnaire | | | | | |
| BSDMWKHW | Time spent by students to do their Math homework. | 1.14 | 0.59 | 0.55 | ✓ |
| BSDSWKHW | Time spent by students to do their Science homework. | 1.01 | 0.47 | 0.54 | ✓ |
| School Questionnaire | | | | | |
| BCDGSRS | Impact of shortage in teaching materials for Science. | 1.12 | 1.01 | 0.11 | ✓ |
| BCDGMRS | Impact of shortage in teaching materials for Math. | 1.16 | 1.01 | 0.15 | ✓ |
| BCDG06HY | number of hours devoted to teaching in one scholastic year. | 1102.66 | 1041.08 | 61.58 | ✓ |
| Math Teacher Questionnaire | | | | | |
| BTDGCIT | Cooperation among Math teachers to upgrade education. | 1.29 | 1.10 | 0.19 | ✓ |
| BTDGTWC | Work environment for Math teacher. | 1.39 | 1.30 | 0.09 | |
| BTDGSOS | School safety and security from the viewpoint of Math teacher. | 1.70 | 1.29 | 0.41 | ✓ |
| BTDM30NU | Readiness of Math teachers to teach numbers. | 94.11 | 91.59 | 2.52 | |
| BTDM30AL | Readiness of Math teachers to teach Algebra. | 91.67 | 92.46 | 0.79 | |
| BTDM30GE | Readiness of Math teachers to teach Geometry. | 84.90 | 87.09 | 2.19 | |
| BTDM30DT | Readiness of Math teachers to teach data. | 83.75 | 51.19 | 32.56 | ✓ |
| BTDMYIT | Number of hours devoted to teach Math in one scholastic year. | 141.35 | 129.78 | 11.57 | ✓ |
| Science Teacher Questionnaire | | | | | |
| BTDGCIT | Cooperation among Science teachers to upgrade education. | 1.38 | 1.15 | 0.23 | ✓ |
| BTDGTWC | Work environment for Science teacher. | 1.33 | 1.28 | 0.05 | |
| BTDGSOS | School safety and security from the viewpoint of Science teacher | 1.68 | 1.26 | 0.42 | ✓ |
| BTDS29BI | Readiness of Science teachers to teach Biology. | 78.61 | 68.20 | 10.41 | ✓ |
| BTDS29CH | Readiness of Math teachers to teach Chemistry. | 76.85 | 83.60 | 6.75 | |
| BTDS29PH | Readiness of Math teachers to teach Physics. | 78.69 | 77.71 | 0.98 | |
| BTDS29ES | Readiness of Math teachers to teach Geology. | 65.25 | 67.35 | 2.1 | |
| BTDSYIT | Number of hours devoted to teach Science in one scholastic year | 140.95 | 133.83 | 7.12 | ✓ |

To get indicators with acceptable degree of validity and reliability, the following indicators were derived from the study questionnaires:

1. Economic and social level
2. Students' problems
3. Good teaching
4. Teaching obstacles
5. Teacher's problems
6. School problems
7. Using computer

For more information on the items that these indicators included, see Annex (1) as shown. Table (20) shows the correlation coefficients for these indicators with the achievement in math by year. The correlation coefficients show negative correlation between any of the following indicators: The students' problems, teaching obstacles, teachers problems, and the school problems and achievement in math in 2007 and in 2011, and they were all statistically significant at ($\alpha = 0,01$)

Table (132)
Correlation of the indicators in Math by Year

| Indicator | Year | |
|----------------------------------|---------|---------|
| | 2007 | 2011 |
| Economic and social level | .234** | .293** |
| Students' problems | -.029** | -.217** |
| Good teaching | .047** | .055** |
| Teaching obstacles | -.144** | -.023** |
| Teacher's problems | -.104** | -.103** |
| School problem | -.133** | -.041** |
| Using computer | .061** | .008** |

Correlation is statistically significant at ($\alpha = 0,01$)

Moreover, the correlation coefficients between any of the following indicators were positive: Economic and social level, good teaching, the use of computers and achievement in math in both years of the study 2007.2011 and all of which were statistically significant at ($\alpha = 0.01$). These indicators are can be ordered according to the strength of the relationship between them and achievement starting from the strongest to the weakest in 2007 as follows:

Economic and social levels, teaching obstacles, school's problems, teacher's problems, using computers, good teaching, and students' problems. In 2011,the order was as follows: Economic and social level, students' problems, teacher's problems, good teaching, school's problems, teaching obstacles, the use of computers.

To find out the relative importance of these indicators and their impact on the achievement in math, multiple regression analysis was used, where all indicators were introduced in the model

as independent variables and achievement in mathematics as dependent variable. Table (20) shows the results of this analysis.

Table (21) shows that the teaching obstacles indicator was not statistically significant at ($\alpha=0.01$) in 2011, while all other indicators were statistically significant. In 2007, all indicators were statistically significant at ($\alpha=0.01$).

Table (133)
Multiple Regression Coefficients for Standardized and Non Standardized Indicators and the Standard Error and T- Value and its Statistical Significance in Math by Year

| Indicator | 2007 | | | | | 2001 | | | | |
|----------------------------|------------------------------|----------------|--------------------------|----------|--------------------------|------------------------------|----------------|--------------------------|----------|--------------------------|
| | Non Standardized Coefficient | | Standardized Coefficient | T- Value | Statistical Significance | Non Standardized Coefficient | | Standardized Coefficient | T- Value | Statistical Significance |
| | B | Standard Error | Beta | | | B | Standard Error | Beta | | |
| Fixed | 437.522 | 1.264 | | 346.025 | .000 | 381.893 | 1.196 | | 319.233 | .000 |
| Economic and social levels | 9.448 | .148 | .193 | 63.624 | .000 | 12.314 | .129 | .270 | 95.563 | .000 |
| teaching obstacles | -3.629 | .289 | -.037 | 12.580 | .000 | -14.599 | .211 | -.195 | -69.100 | .000 |
| school's problems | 4.456 | .301 | .044 | 14.782 | .000 | 3.148 | .293 | .030 | 10.745 | .000 |
| teacher's problems | -20.889 | .504 | -.125 | 41.464 | .000 | -.418 | .571 | -.002 | -.732 | .464 |
| using computers | -5.602 | .323 | -.053 | 17.339 | .000 | -9.313 | .353 | -.075 | -26.394 | .000 |
| good teaching | -2.351 | .097 | -.077 | 24.131 | .000 | -.927 | .069 | -.038 | -13.370 | .000 |
| students' problems | 3.387 | .617 | .017 | 5.486 | .000 | 2.723 | .555 | .014 | 4.905 | .000 |
| R2 | .083 | | | | | .135 | | | | |

The descending order of the indicators in terms of their relative importance in 2007 was as follows: economic and social levels, teaching obstacles, school's problems, teacher's problems, good teaching, students' problems and using computers,. In 2011 the indicators' order was as follows: economic and social level, students' problems, teacher's problems, school's problems, good teaching, using computers.

The difference of the relative importance of these indicators and the value of the Standardized Coefficient beta B indicate that the impact of students' problems on the achievement increased in 2011, five times more than it was in 2007. This might reflect one of the decline factors in math achievement. The impact of teacher's problems on achievement increased in 2011, one and half times than it was 2007. This also indicates that the teacher's problems might be another factor in math achievement.

Table (22) shows the coefficients correlation for these indicators with science achievement by year. The coefficients correlation showed negative relation among any of the following indicators: students problems, teaching obstacles, teacher's problems, school problems on one hand and the achievement in science on the other hand in 2007 and in 2011, and all were statistically significant at ($\alpha = 0.01$). The coefficients correlation were positive among any of the following indicators: economic and social levels, good teaching, using computers on one hand and the achievement in science on the other hand in 2007 and in 2011 and were statistically significant at ($\alpha = 0.01$) except for good teaching that was not statistically significant in 2007.

Table (134)
Correlation of the indicators in Science by Year

| Indicator | Year | |
|----------------------------------|---------|---------|
| | 2007 | 2011 |
| Economic and social level | .241** | .223** |
| Students' problems | -.095** | -.240** |
| Good teaching | .020 | .041** |
| Teaching obstacles | -.021** | -.066** |
| Teacher's problems | -.044** | -.173** |
| School problem | -.142** | -.096** |
| Using computer | .044** | .010** |

**Correlation is statistically significant at ($\alpha = 0,01$)

These indicators are can be ordered according to the strength of the relationship between them and achievement in science starting from the strongest to the weakest in 2007 as follows: Economic and social levels, school's problems, students' problems, teacher's problems, using computers, teaching obstacles, good teaching. In 2011, the order was as follows: Students' problems, economic and social level, teacher's problems, school's problems, teaching obstacles, good teaching and the use of computers.

To find out the relative importance of these indicators and their impact on the achievement in science, multiple regression analysis was used, where all indicators were introduced in the model as independent variables and the achievement in science as a dependent variable. Table (23) shows the results of this analysis.

Table (23) shows that the good teaching indicator was not statistically significant at ($\alpha=0.01$) in 2007, while all other indicators were statistically significant. In 2011, all indicators were statistically significant at ($\alpha=0.01$).

Table (135)
Multiple Regression Coefficients for Standardized and Non Standardized Indicators and the Standard Error and T- Value and its Statistical Significance in Science by Year

| Indicator | 2007 | | | | | 2001 | | | | |
|----------------------------|------------------------------|----------------|--------------------------|----------|--------------------------|------------------------------|----------------|--------------------------|----------|--------------------------|
| | Non Standardized Coefficient | | Standardized Coefficient | T- Value | Statistical Significance | Non Standardized Coefficient | | Standardized Coefficient | T- Value | Statistical Significance |
| | B | Standard Error | Beta | | | B | Standard Error | Beta | | |
| Fixed | 472.801 | 1.119 | | 422.549 | .000 | 470.748 | 1.188 | | 396.112 | .000 |
| Economic and social levels | 10.786 | .143 | .229 | 75.375 | .000 | 9.086 | .132 | .198 | 68.925 | .000 |
| teaching obstacles | -8.448 | .279 | -.090 | -30.257 | .000 | -15.584 | .215 | -.207 | -72.432 | .000 |
| school's problems | .312 | .216 | .004 | 1.448 | .148 | 1.148 | .193 | .018 | 5.950 | .000 |
| teacher's problems | -2.029 | .375 | -.016 | -5.417 | .000 | -5.757 | .328 | -.050 | -17.577 | .000 |
| using computers | 1.564 | .285 | .017 | 5.493 | .000 | -12.950 | .296 | -.129 | -43.801 | .000 |
| good teaching | -3.965 | .108 | -.116 | -36.549 | .000 | -2.630 | .096 | -.080 | -27.472 | .000 |
| students' problems | +1.554 | .590 | +.008 | -2.631 | .009 | +.534 | .565 | -.003 | +.944 | .345 |
| R2 | .081 | | | | | .129 | | | | |

The descending order of the indicators in terms of their relative importance in 2007 was as follows: economic and social levels, school's problems, teaching obstacles, students' problems, teacher's problems, teaching obstacles, using computers and good teaching. In 2011, the indicators' order was as follows: students' problems, economic and social level, teacher's problems, school's problems, teaching obstacles, good teaching, and using computers.

The difference of the relative importance of these indicators and the value of the Standardized Coefficient beta B indicate that the impact of the teacher's problems on the achievement in science increased in 2011, seven times more than it was in 2007. Moreover, the impact of students' problems increased almost twice in 2011 than in 2007 while the impact of teaching obstacles in 2011 increased about three times than it was in 2007.

These results show that the following factors are proposed decline factors in science achievement in 2011 compared to 2007: teacher's problems, students' problems, and teaching obstacles. Furthermore, TIMSS and NAFKE studies agreed that the teacher's problems is a highly proposed factor in the students' achievement in 2011 than it was in 2007.

Table (23) shows the coefficients correlation for these indicators with science achievement by year. The coefficients correlation showed negative relation among any of the following indicators: students problems, teaching obstacles, teacher's problems, school problems on one hand and the achievement in science on the other hand in 2007 and in 2011, and all were statistically significant at ($\alpha = 0.01$). The coefficients correlation were positive among any of the following indicators: economic and social levels, good teaching, using computers on one hand and the achievement in science on the other hand in 2007 and in 2011 and were statistically significant at ($\alpha = 0.01$) except for good teaching that was not statistically significant in 2007.

Chapter Seven

Conclusions and Recommendations

For more than two decades, Jordan has always been keen on participating in international studies. This participation was for the first time in 1991, and continues until the present time. These studies provide good opportunity to assess education quality by comparing our educational system with educational systems of the participating countries and to benefit from their experiences in developing the Jordanian educational system and improving students' learning achievement. Jordan has already taken part in these international studies in 1991, 1999, 2003, 2007, 2011 and got the following ranks in Math:

18 out of a total of 19 countries in 1991.

32 out of a total of 38 countries in 1999.

33 out of a total of 46 countries in 2003.

31 out of a total of 49 countries in 2007.

35 out of a total of 45 countries in 2011.

In Science students' performance was:

18 out of a total of 19 countries in 1991.

30 out of a total of 38 countries in 1999.

26 out of a total of 46 countries in 2003.

20 out of a total of 49 countries in 2007.

28 out of a total of 45 countries in 2011.

At the Arab level, Jordan came in the first rank in Science in 1999, 2003, 2007. However, Jordan ranked third in the last study conducted in 2011. In Math, Jordan got the second rank in 1999, 2003, and 2007, but ranked sixth in the last study conducted in 2011.

The findings of the study showed a decline of (21) points in Math and (33) points in Science at the country's level by comparing the results of the last two sessions of the study (2007 and 2011).

The decline size varied according to gender, school location and the supervising authority. The decline of male students' performance was 25 points in Math and 38 points in Science, whereas for the females it was less at 18 points in Math and 28 points in Science. It is worth mentioning that the performance of females in these two subjects was better than their male peers in 2007 and 2011.

Regarding the school location, the figures show that there was a decrease of (17 points) in the performance of students living in urban areas in Math and a decline of (27 points) in Science. As for students living in rural areas, the decline was higher at (40) points in Math and (54) points in Science. It is worth mentioning that the performance of students in the urban areas was better than those in rural areas in 2007 and 2011 regardless of the subject. Regarding the supervising authority, the highest decline was at the UNRWA students at (57) points in Math and (59) points in Science, followed by the MoE schools at (18) points in Math and (32) points in Science.

The lowest decline was in the private schools as the students' performance fell only at (17) points in Math and at (22) points in Science.

The study explored the causes and factors that led to such decline by identifying the variables with statistically significant changes in 2007 and 2011. This decline could be attributed to the following:

1. **General factors:** These factors were derived from more than one item in order to be a more valid and reliable measurement for the trait we plan to measure. These include:
 - Students' attitudes towards Math and Science were better in 2007 compared with 2011.
 - There was a decline in the number of hours allocated for teaching Math and Science in 2011 compared with 2007.
 - There were less available resources to teach Math and Science in 2011 compared with their availability in 2007.
 - Low percentage of computers' utilization in teaching Math and Science in 2011 compared with 2007.
 - The level of security and safety at the school is lesser in 2011 compared with 2007.
 - The lack of seriousness of students in 2011 to answer Math test questions, since the percentage of students' performance in Math was below the standard or equal to 18%. It should be noted that this percentage may reflect their obvious weakness in Math, as most of them gave inappropriate answers to the questions.
 - Students spend less time in doing their Math and Science homework in 2011 compared with 2007.
 - Cooperation among teachers in 2011 was poor compared with 2007.
2. **Factors related to schools:** These factors were derived from the school questionnaire which was filled by the school principal.
 - Schools in 2011 were more crowded compared with 2007.
 - Less Visual and audio resources for teaching Math and Science in 2011 compared with 2007.
 - There was an increase in the number of students who make troubles in classrooms and cheat in exams besides the verbal abuse towards their teachers in 2011 compared with 2007.
 - Absence among teachers, teachers' late arrival to school and early leave were higher in 2011 compared with 2007.

3. **Factors related to teachers:** These factors were derived from the Math and Science teachers questionnaires.

Math teacher questionnaire:

- Math teachers in 2011 were less qualified compared with 2007.
- Poor participation of students' parents in school activities in 2011 compared with 2007.

- Decline in the level of students' loyalty to maintain school properties in 2011 compared with 2007.
- Students' willingness to pass in Math test became lower in 2011 compared with 2007.
- Low percentage of school security and safety in 2011 compared with 2007 as well as the feeling of insecurity of Math teachers.
- Overcrowded classrooms and inconvenient place for learning in 2011 compared with 2007.
- Higher rate of tiresome and careless students in 2011 compared with 2007.
- Math teachers are less interested in linking Math with real life situations in 2011 compared with their peers in 2007.
- Math teachers give less focus on Math applications compared with their peers in 2007.
- Low level of Math teachers' participation in the professional development activities (relating to Math content, teaching methods and techniques and ICT inclusion) in 2011 compared with 2007.
- Math teachers' interest to enhance critical thinking and students' achievement assessment is declining in 2011 compared with 2007.
- Math teachers' readiness in 2011 to teach some mathematical topics such as the relationship between the three-dimensional shapes and their representation in two dimensions was below its level in 2007.

Science Teacher Questionnaire

- Science teachers' understanding of the curricula objectives in 2011 is below its level in 2007.
- Science teachers are less successful and skilful in applying approved curricula in 2011 compared with their peers in 2007.
- Students' willingness to pass in Science test became lower in 2011 compared with 2007.
- Decline in the level of students' loyalty to maintain school properties in 2011 compared with 2007.
- Low percentage of school security and safety in 2011 compared with 2007 as well as the feeling of insecurity of Math teachers.
- Overcrowded classrooms and inconvenient place for learning in 2011 compared with 2007.
- Science teachers are less interested in giving students the opportunity to: watch natural scenery, make experiments and conduct research, explain the problems they learn and link what they learn with real life situations in 2011 compared with 2007.
- Low level of Science teachers' participation in the professional development activities (relating to Math content, teaching methods and techniques and ICT inclusion) in 2011 compared with 2007.
- Science teachers' interest to enhance critical thinking and students' achievement assessment is declining in 2011 compared with 2007.
- Fewer computers were available for utilization in teaching Science in 2011 compared with 2007.

- Science teachers do not give much interest to continuous assessment of students' performance and class tests in 2-11 compared with 2007.

4. Factors related to students:

These factors were derived from the student questionnaire.

- Students in 2011 were less optimistic in 2011 compared with their peers in 2007.
- Students in 2011 were exposed to insult, ridicule or verbal abuse, theft and were beaten by their colleagues in a much higher degree in 2011 compared with 2007.
- Students in 2011 are less interested in learning Math compared with their peers in 2007.
- More students in 2011 think that Math is a boring subject compared with their peers in 2007.
- Students in 2011 spend less time in doing their homework compared with 2007.

It is worth mentioning that 2011 witnessed unusual conditions that affected the learning environment and students' discipline.

Actually, the data provided by TIMSS study showed that there are proposed factors behind the dramatic decline in students' results relating to students, their families, teachers, principals, schools and the community. It is imperative that we exert intensive efforts to get out from this dilemma since the investment of Jordan is its human resources. Therefore, all teachers, principals, administrators, students, the local community and the Ministry of Education are invited to plan actively to address this imbalance. It is also a must that all parts of the Ministry of Education, its policy makers, planners, and other stakeholders, take these decline factors into consideration to design realistic, applicable, and relevant and logical policies to restore the strength and soundness of our educational system at the Arab level and achieve satisfactory ranks at the international level. The NCHRD has developed an initial plan to support the MoE in taking the necessary measures to seriously participate in the international upcoming participation in the study. (See annex 3).

The findings of the study revealed that female students' performance in Math and Science was better than males in 199, 2003, 2007 and 2011 respectively. Given that the curricula are the same for male and females, the Ministry has to explore the cause of this decline and see the reason behind the difference in their performance. The problem could be related to the quality of teachers and school administrative staff in the boys' schools.

It is also advisable to study the gap between the performance of male and female students by focusing on collecting qualitative data besides the quantitative data. Moreover, the study showed that the students' results in Math and Science in rural areas was better than in the urban areas. Nonetheless, schools in rural areas are still in need of more support to reach the level of the schools in the urban areas. The provision of qualified teachers requires providing teachers with incentives to retain them and encourage them to stay in rural schools. It was also clear from the findings that the results of students in Math and Science in the private schools in

2011 were better than their peers in the MoE schools, and the students' performance in the UNRWA schools in 2011 was higher than the MoE schools in Math and science.

Generally, the MoE schools should benefit from the expertise of the private schools to upgrade students' education level and apply a systematic monitoring and accountability process at public schools.

TIMSS provides a huge database collected from students, teachers and school administrators, and this data is distinguished with its high quality in terms of validity and reliability in addition to its relevance to international comparisons. It is imperative that researchers in universities and research centers conduct further analysis and study available database to enable decision-makers and educational policy planners to introduce the required educational innovations. Such innovations will hopefully help upgrade our educational system, stop the decline in students' results and develop their performance levels.

ANNEX 1

Annex (1): Performance Averages and Schools Ranks in Math and Science and in both Subjects in TIMSS 2011

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|---|-----------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Patriarch Diodoros 1st | Aqaba | Private Sector | 553 | 596 | 575 | 1 | 1 | 1 |
| Amawi Neighborhood Secondary School | Amman Center | MoE | 532 | 586 | 559 | 5 | 2 | 2 |
| Islamic Scientific College / females / Jabal Amman | Amman Center | Private Sector | 533 | 563 | 548 | 4 | 5 | 3 |
| Alittihad / females / Tariq | Aljamaa' Province | Private Sector | 524 | 571 | 548 | 7 | 3 | 4 |
| Islamic Center Society Basic School – Jabal Alameerah Rahma | Zarqa 1 st | Private Sector | 528 | 566 | 547 | 6 | 4 | 5 |
| International Pioneers Academy / Secondary / males | Aljamaa' Province | Private Sector | 533 | 556 | 545 | 3 | 6 | 6 |
| University 1st School / males | Aljamaa' Province | Private Sector | 536 | 552 | 544 | 2 | 7 | 7 |
| Rosary / Shmeisani | Amman Center | Private Sector | 517 | 552 | 535 | 8 | 8 | 8 |
| Bint Uday Comprehensive Secondary Mixed School | Aljamaa' Province | MoE | 514 | 551 | 533 | 9 | 9 | 9 |
| Queen Noor Al Hussein Secondary / females | Amman Center | MoE | 492 | 537 | 515 | 13 | 11 | 10 |
| Roman Catholic School for Boys | Zarqa | Private Sector | 496 | 532 | 514 | 11 | 17 | 11 |
| National Orthodox / Alashrafieh | Amman Center | Private Sector | 499 | 528 | 513 | 10 | 20 | 12 |
| Nozha Females Preparatory fourth | UNRWA - North Amman | UNRWA | 493 | 533 | 513 | 12 | 15 | 13 |
| Alatheer Schools | Qweismeh Province | Private Sector | 487 | 537 | 512 | 15 | 12 | 14 |

| | | | | | | | | |
|--|--------------------|----------------|-----|-----|-----|----|----|----|
| Prince Hamzah Bin Al Hussein | Wadi Seer Province | Private Sector | 484 | 539 | 511 | 20 | 10 | 15 |
| Tamadur bint Amr Basic School/ Girls | Zarqa 1st | MoE | 485 | 533 | 509 | 18 | 16 | 16 |
| Natefah Basic School/ Girls | Irbid Center | MoE | 484 | 527 | 506 | 19 | 21 | 17 |
| Alqusoor Preparatory School | UNRWA North Amman | UNRWA | 480 | 529 | 505 | 21 | 19 | 18 |
| Jandaweel Comprehensive Secondary School /Girls | Wadi Seer Province | MoE | 485 | 524 | 505 | 17 | 23 | 19 |
| Cordoba International | Qweismeh Province | Private Sector | 486 | 521 | 503 | 16 | 25 | 20 |
| Modern Education | Marka Province | Private Sector | 471 | 530 | 500 | 29 | 18 | 21 |
| Mansheya Comprehensive Secondary School for Girls | Kerak Center | MoE | 466 | 534 | 500 | 32 | 14 | 22 |
| Hafsa bint Omar Basic School for Girls | Ramtha | MoE | 478 | 518 | 498 | 25 | 26 | 23 |
| Alzuhoor Preparatory School for Females | UNRWA Amman South | UNRWA | 474 | 521 | 498 | 28 | 24 | 24 |
| Abdullah bin Qais Al-Harhi Basic School for Boys | Aqaba | MoE | 477 | 518 | 497 | 26 | 27 | 25 |
| Der Latins (National Patriarchate School | Marka Province | Private Sector | 480 | 512 | 496 | 22 | 32 | 26 |
| Hussein Preparatory School for Females | UNRWA-Amman North | UNRWA | 455 | 536 | 495 | 48 | 13 | 27 |
| Qadisiyah Mixed Secondary School | Bseirah Province | MoE | 463 | 527 | 495 | 37 | 22 | 28 |
| Alaal Secondary Comprehensive School for Boys | Irbid Center | MoE | 479 | 507 | 493 | 23 | 36 | 29 |
| Alnukhbeh / males | Aljamaa' Province | Private Sector | 488 | 497 | 492 | 14 | 53 | 30 |
| Princess Rahma Bint El Hassan Basic School for Girls | Amman Center | MoE | 476 | 506 | 491 | 27 | 39 | 31 |

| | | | | | | | | |
|--|--------------------------|----------------|-----|-----|-----|----|----|----|
| Swaileh Preparatory School for Males | UNRWA- Amman North | UNRWA | 463 | 518 | 490 | 40 | 28 | 32 |
| Halle Bint Khuweiled Secondary School for Girls | Salt Center | MoE | 465 | 515 | 490 | 35 | 29 | 33 |
| Albaqa' Seond Preparatory School for Males | UMRWA- Amman North | UNRWA | 478 | 502 | 490 | 24 | 45 | 34 |
| Umm Habiba Secondary School For Girls | Wadi Seer Province | MoE | 462 | 515 | 488 | 41 | 30 | 35 |
| Alhashemi Second Preparatory School for Males | UNRWA- Amman North | UNRWA | 462 | 511 | 486 | 42 | 34 | 36 |
| Altanweer Private School | Qweismeh Province | Private Sector | 458 | 511 | 485 | 44 | 33 | 37 |
| Irbid Model Secondary Mixed School | Irbid Center | Private Sector | 463 | 506 | 484 | 38 | 41 | 38 |
| Sakhras Comprehensive Secondary School for Boys | Ajloun | MoE | 464 | 505 | 484 | 36 | 42 | 39 |
| Faisal 1st Basic School for Boys | Aqaba | MoE | 469 | 499 | 484 | 30 | 51 | 40 |
| Aljazae'r Basic School for Females | Amman Center | MoE | 465 | 498 | 482 | 33 | 52 | 41 |
| Western Shmeisani Basic School for Girls | Amman Center | MoE | 457 | 506 | 481 | 46 | 40 | 42 |
| Nozha Third Preparatory for Males | UNRWA- Amman North | UNRWA | 455 | 507 | 481 | 47 | 38 | 43 |
| Marka Second Preparatory School for Females | UNRWA- Zarqa' | UNRWA | 452 | 510 | 481 | 52 | 35 | 44 |
| Um Manei' Basic Mixed School | Aljamaa' Province | MoE | 458 | 504 | 481 | 45 | 43 | 45 |
| Khalda Comprehensive Secondary School for Girls | Aljamaa' Province | MoE | 459 | 502 | 481 | 43 | 46 | 46 |
| Waqas Females Preparatory School | UNRWA- Irbid | UNRWA | 446 | 513 | 480 | 59 | 31 | 47 |
| Deir Abi Sa'eed Comprehensive Secondary School for Girls | Alkourah | MoE | 451 | 507 | 479 | 53 | 37 | 48 |

| | | | | | | | | |
|--|-----------------------------------|----------------|-----|-----|-----|----|----|----|
| Alkhader Modern Schools | Marka Province | Private Sector | 463 | 494 | 478 | 39 | 55 | 49 |
| Marka Fourth Preparatory School for Females | UNRWA-Zarqa' | UNRWA | 465 | 491 | 478 | 34 | 61 | 50 |
| Umm Kulthum Comprehensive Secondary School | Zarqa 1st | MoE | 453 | 500 | 476 | 50 | 47 | 51 |
| Zaid bin Haritha Secondary School for Boys | Kerak Center | MoE | 452 | 499 | 476 | 51 | 48 | 52 |
| Israa' Basic School for Girls | Amman Center | MoE | 451 | 499 | 475 | 54 | 50 | 53 |
| Scientific Reyadah School | Aljamaa' Province | Private Sector | 466 | 481 | 474 | 31 | 82 | 54 |
| Erwiem Secondary School for Girls | Tafeeleh | MoE | 442 | 503 | 473 | 65 | 44 | 55 |
| Saham Mixed Secondary Comprehensive | Bani Kenaneh | MoE | 446 | 499 | 472 | 60 | 49 | 56 |
| Waqas Males Preparatory School | UNRWA-Irbid | UNRWA | 454 | 485 | 470 | 49 | 66 | 57 |
| Kufur Ebeil Comprehensive Secondary School for Girls | Alkourah | MoE | 441 | 497 | 469 | 67 | 54 | 58 |
| Nahawand Basic Mixed | Ramtha | MoE | 445 | 493 | 469 | 63 | 56 | 59 |
| Qmeim Comprehensive Secondary School for Boys | Altaibeh and Alwasteyeh Provinces | MoE | 449 | 486 | 468 | 55 | 62 | 60 |
| Oxford | Aljamaa' Province | Private Sector | 442 | 492 | 467 | 66 | 58 | 61 |
| Alhashemi First Preparatory School for Females | UNRWA-Amman North | UNRWA | 445 | 483 | 464 | 61 | 71 | 62 |
| Sakeb Comprehensive Secondary School for Boys | Jerash | MoE | 447 | 482 | 464 | 57 | 77 | 63 |
| Abu Bakr Basic School for Boysl | Irbid Center | MoE | 449 | 479 | 464 | 56 | 86 | 64 |
| Angara basic School for Boys | Ajloun | MoE | 446 | 481 | 463 | 58 | 83 | 65 |
| Enbeh Secondary Comprehensive School for Boys | North Mazar Province | MoE | 444 | 483 | 463 | 64 | 73 | 66 |
| Huwara Basic School for Girls. | Irbid Center | MoE | 432 | 491 | 462 | 83 | 59 | 67 |

| | | | | | | | | |
|---|--------------------------|------------------------|-----|-----|-----|----|----|----|
| Nahawand basic mixed | Zarqa 1st | MoE | 441 | 482 | 461 | 68 | 75 | 68 |
| Albaqa' First Preparatory School for Females | UNRWA- Amman North | UNRWA | 430 | 493 | 461 | 84 | 57 | 69 |
| Um Aljmal Secondary Comprehensive Mixed School | East North Badia | MoE | 437 | 486 | 461 | 73 | 63 | 70 |
| Mahes Secondary School for Girls | Salt Center | MoE | 438 | 485 | 461 | 71 | 67 | 71 |
| Thaher Alsaroo Comprehensive Secondary School for Girls | Jerash | MoE | 438 | 482 | 460 | 70 | 76 | 72 |
| Alkhansa' Secondary Comprehensive Mixed School | Aljamaa' Province | MoE | 434 | 485 | 460 | 78 | 65 | 73 |
| Thaher Alsaroo Basic School for Boys | Jerash | MoE | 439 | 480 | 459 | 69 | 84 | 74 |
| Zabbud Basic Mixed School | Na'our Province | MoE | 433 | 485 | 459 | 81 | 64 | 75 |
| Martyer Faisal 2nd College | Military Education | Ministry of Defense | 434 | 484 | 459 | 79 | 69 | 76 |
| Albaqa' third Preparatory School for Males | UNRWA- Amman North | UNRWA | 436 | 482 | 459 | 75 | 78 | 77 |
| Dar AlSalaam Secondary Mixed School | Marka Province | MoE | 435 | 483 | 459 | 77 | 72 | 78 |
| Queen Zein Al Sharaf School Comprehensive Secondary School for Girls | Aqaba | MoE | 435 | 481 | 458 | 76 | 81 | 79 |
| Abu Bakr Basic School for Boys | Mafraq Center | MoE | 433 | 482 | 458 | 82 | 74 | 80 |
| Zmal Secondary Comprehensive Mixed | Alkourah | MoE | 433 | 481 | 457 | 80 | 80 | 81 |
| Princess Alia Bint Al Hussein Secondary Mixed School | Mafraq Center | MoE | 424 | 491 | 457 | 93 | 60 | 82 |
| AlRusaifa first female Preparatory School | UNRWA- Zarqa' | UNRWA | 436 | 478 | 457 | 74 | 89 | 83 |
| Nusseibeh Bint Ka'eb Basic School for Females | Amman Center | MoE | 428 | 484 | 456 | 86 | 70 | 84 |
| Alrmeimeen Secondary School for Girls | Salt Center | MoE | 427 | 485 | 456 | 87 | 68 | 85 |

| | | | | | | | | |
|--|------------------------------|----------------|-----|-----|-----|-----|-----|-----|
| Yadodeh First Secondary School for Boys | Qweismeh Province | MoE | 429 | 479 | 454 | 85 | 85 | 86 |
| Aljadeedah Secondary School for Boys | Kerak Center | MoE | 445 | 461 | 453 | 62 | 112 | 87 |
| Greek Orthodox Secondary School - Fuhais | Salt Center | Private Sector | 437 | 468 | 452 | 72 | 99 | 88 |
| Tamadur bint Amr First Secondary School for Girls | Rusiafah | MoE | 421 | 482 | 451 | 99 | 79 | 89 |
| Almanahel Secondary School | Zarqa | Private Sector | 421 | 478 | 450 | 97 | 87 | 90 |
| Khaleda Qurashiyyah Secondary Mixed School | Salt Center | MoE | 419 | 478 | 448 | 105 | 88 | 91 |
| Amman New Camp 2nd Preparatory School for Females | UNRWA- Amman South | UNRWA | 419 | 477 | 448 | 104 | 90 | 92 |
| Bushra Secondary Comprehensive Mixed School | Irbid Center | MoE | 421 | 474 | 448 | 98 | 92 | 93 |
| Fatima Alzahra' Comprehensive Secondary School for Girls | West North Badia | MoE | 418 | 475 | 447 | 106 | 91 | 94 |
| Allan Secondary School for Girls | Salt Center | MoE | 422 | 470 | 446 | 96 | 95 | 95 |
| Rajeb Comprehensive Secondary School for Girls | Ajloun | MoE | 425 | 468 | 446 | 89 | 100 | 96 |
| Aisha Albaoniah Secondary Comprehensive for Girls | Zarqa 1st | MoE | 423 | 469 | 446 | 94 | 96 | 97 |
| Ali Redha Alrikabi Basic School for Boys | Aljamaa' Province | MoE | 424 | 467 | 446 | 92 | 101 | 98 |
| Juwaideh Secondary School for Girls | Qweismeh Province | MoE | 425 | 466 | 446 | 90 | 102 | 99 |
| Zarqa' Alyamamah Basic School for Girls | Zarqa | MoE | 426 | 464 | 445 | 88 | 106 | 100 |
| Fatima Alzahra Basic Mixed | Jerash | MoE | 415 | 473 | 444 | 110 | 93 | 101 |
| Almuaqqer Comprehensive Secondary School for Girls | Mid Badia / Muaqqer Province | MoE | 410 | 473 | 441 | 119 | 94 | 102 |
| Jaber Bin Hayyan Basic School for Boys | Rusiafah | MoE | 425 | 457 | 441 | 91 | 117 | 103 |
| Husniyah First Secondary School for Girls | Qweismeh Province | MoE | 412 | 468 | 440 | 116 | 97 | 104 |
| Saffanah Bint Hatem First Secondary School for Girls | Marka Province | MoE | 417 | 463 | 440 | 108 | 107 | 105 |

| | | | | | | | | |
|---|--------------------|----------------|-----|-----|-----|-----|-----|-----|
| Jubaiha Secondary School for Boys | Aljamaa' Province | MoE | 418 | 461 | 439 | 107 | 111 | 106 |
| Sakib Comprehensive Secondary School for Girls | Jerash | MoE | 412 | 462 | 437 | 113 | 110 | 107 |
| Abu Huraira Basic School for Boys | Amman Center | MoE | 419 | 454 | 437 | 103 | 122 | 108 |
| Hatem Comprehensive Secondary School for Girls | Bani Kenaneh | MoE | 408 | 465 | 437 | 121 | 103 | 109 |
| Ruqayyah Bint Alrasool Secondary Mixed School | Amman Center | MoE | 407 | 464 | 436 | 123 | 105 | 110 |
| Allfarouk Secondary School for Boys | Wadi Seer Province | MoE | 421 | 451 | 436 | 100 | 130 | 111 |
| Zaid bin Haritha Secondary School for Boys | Salt Center | MoE | 411 | 460 | 436 | 117 | 113 | 112 |
| Prince Rashid Basic School for Boys | Amman Center | MoE | 423 | 448 | 435 | 95 | 135 | 113 |
| Jabal Amman Basic School for Girls | Amman Center | MoE | 412 | 458 | 435 | 115 | 115 | 114 |
| Marka 1st Preparatory School for Males | UNRWA-Zarqa' | UNRWA | 420 | 447 | 433 | 102 | 140 | 115 |
| Albara' bin Malik Secondary School For Boys | Na'our Province | MoE | 420 | 446 | 433 | 101 | 141 | 116 |
| Amenah Bint Alarqam Basic for females | Zarqa 1st | MoE | 401 | 464 | 433 | 133 | 104 | 117 |
| Alfadeen Basic Mixed School | Mafrq Center | MoE | 398 | 468 | 433 | 139 | 98 | 118 |
| Alsafwah Model Basic Mixed School | Mafrq Center | Private Sector | 416 | 450 | 433 | 109 | 132 | 119 |
| Ebein Eblien Comprehensive Secondary School for Girls | Mafrq Center | MoE | 408 | 458 | 433 | 122 | 116 | 120 |
| Mastabeh Comprehensive Secondary School for Girls | Jerash | MoE | 411 | 454 | 432 | 118 | 124 | 121 |
| Almanarah Basic Mixed | Marka Province | MoE | 404 | 460 | 432 | 127 | 114 | 122 |
| Um Ma'abad Secondary School for Girls | Amman Center | MoE | 412 | 452 | 432 | 111 | 128 | 123 |
| Bader Alkubrah Comprehensive Secondary School for Girls | Zarqa 1st | MoE | 401 | 462 | 432 | 134 | 109 | 124 |

| | | | | | | | | |
|---|--------------------|----------------|-----|-----|-----|-----|-----|-----|
| Umm Shuraik Alansariyeh Secondary Mixed School | Zarqa 2nd | MoE | 399 | 462 | 431 | 136 | 108 | 125 |
| Irbid City 3rd Preparatory School | UNRWA-Irbid | UNRWA | 405 | 455 | 430 | 126 | 119 | 126 |
| Hadeeqat Tunis Basic Mixed School | Irbid Center | MoE | 408 | 451 | 430 | 120 | 129 | 127 |
| Yarmouk Secondary School for Girls | Amman Center | MoE | 402 | 454 | 428 | 130 | 123 | 128 |
| Naifeh Secondary School for Girls | Marka Province | MoE | 402 | 453 | 427 | 132 | 125 | 129 |
| Irbid City 3rd Preparatory School for Males | UNRWA-Irbid | UNRWA | 412 | 441 | 426 | 112 | 151 | 130 |
| Mobes Secondary Mixed School | Ein Albasha | MoE | 405 | 447 | 426 | 125 | 139 | 131 |
| Nusseibah Almazeniah Basic School for girls | Rusiafah | MoE | 404 | 446 | 425 | 128 | 142 | 132 |
| Um Albasateen Secondary School for Girls | Na'our Province | MoE | 398 | 451 | 425 | 137 | 131 | 133 |
| Sakhrah Comprehensive Secondary School for Girls | Ajloun | MoE | 395 | 453 | 424 | 146 | 126 | 134 |
| Princess Haya Bint Al Hussein Basic Mixed School | Na'our Province | MoE | 396 | 452 | 424 | 145 | 127 | 135 |
| Alashrafieh Secondary School for Girls | Amman Center | MoE | 393 | 455 | 424 | 149 | 120 | 136 |
| Um Alamad Basic School for Boys | Salt Center | MoE | 403 | 444 | 424 | 129 | 146 | 137 |
| Petra Basic Mixed School | Amman Center | MoE | 397 | 449 | 423 | 143 | 134 | 138 |
| Alqimmah 2nd School | Wadi Seer Province | Private Sector | 407 | 439 | 423 | 124 | 152 | 139 |
| Princess Taghreed Secondary exploratory Mixed School | Qweismeh Province | MoE | 390 | 456 | 423 | 153 | 118 | 140 |
| Althleil Secondary Comprehensive Mixed School | Zarqa 2nd | MoE | 397 | 448 | 422 | 144 | 136 | 141 |
| Rusaifa 3rd Preparatory School for Males | UNRWA-Zarqa' | UNRWA | 400 | 444 | 422 | 135 | 145 | 142 |
| Kafr Almaa' Comprehensive Secondary School for Girls | Alkourah | MoE | 397 | 447 | 422 | 142 | 138 | 143 |
| Thaghret Aljubb Comprehensive Secondary School for Boys | West North Badia | MoE | 402 | 441 | 421 | 131 | 150 | 144 |

| | | | | | | | | |
|--|--------------------|-------|-----|-----|-----|-----|-----|-----|
| Um Amarah Secondary School for Girls | Sahab Province | MoE | 391 | 450 | 420 | 151 | 133 | 145 |
| Ekremah Secondary School for Boys | Zarqa 2nd | MoE | 412 | 428 | 420 | 114 | 164 | 146 |
| Abu Alanda Secondary School for Girls | Qweismeh Province | MoE | 385 | 455 | 420 | 163 | 121 | 147 |
| Omar Almukhtar Basic for Boys | Irbid Center | MoE | 398 | 441 | 419 | 141 | 149 | 148 |
| Alhashemiah Secondary School for Girls | Aqaba | MoE | 393 | 445 | 419 | 148 | 143 | 149 |
| Ajnadeen Basic School for Girls | Irbid Center | MoE | 388 | 447 | 418 | 160 | 137 | 150 |
| Shajaret Aldurr Basic School for Girls | Amman Center | MoE | 388 | 445 | 416 | 159 | 144 | 151 |
| Amrawah Secondary School for Boys | Ramtha | MoE | 398 | 435 | 416 | 138 | 156 | 152 |
| Shukri Sha'sha'a Secondary School for Boys | Amman Center | MoE | 395 | 435 | 415 | 147 | 155 | 153 |
| Jerash Camp ist Preparatory School for Boys | UNRWA-Irbid | UNRWA | 389 | 435 | 412 | 155 | 154 | 154 |
| Alazraq Secondary Mixed School | Zarqa 2nd | MoE | 379 | 443 | 411 | 167 | 147 | 155 |
| Abu Obeida Basic School for Boys | Marka Province | MoE | 398 | 424 | 411 | 140 | 169 | 156 |
| Akka Basic School for Girls | Irbid Center | MoE | 390 | 430 | 410 | 152 | 162 | 157 |
| Marj Alhamam Secondary School for Boys | Wadi Seer Province | MoE | 388 | 431 | 410 | 158 | 160 | 158 |
| Aliskan Secondary Mixed School | Ma'an | MoE | 382 | 434 | 408 | 164 | 157 | 159 |
| Der Alliyat Comprehensive Secondary School for Girls | Jerash | MoE | 373 | 443 | 408 | 178 | 148 | 160 |
| Prince Talal Basic School for Boys | Zarqa 1st | MoE | 389 | 424 | 406 | 157 | 167 | 161 |
| Ebein Basic School for Boys | Ajloun | MoE | 390 | 423 | 406 | 154 | 171 | 162 |
| Hariemah Comprehensive Secondary School for Boys | Bani Kenaneh | MoE | 385 | 427 | 406 | 162 | 165 | 163 |
| Alashrafieh 2nd Preparatory School for boys | UNRWA-Amman South | UNRWA | 386 | 424 | 405 | 161 | 170 | 164 |
| Qweismeh Secondary School for Girls | Qweismeh Province | MoE | 376 | 433 | 405 | 171 | 158 | 165 |

| | | | | | | | | |
|--|-------------------------------|-------|-----|-----|-----|-----|-----|-----|
| Almabrookeh Comprehensive Secondary School for Girls | West North Badia | MoE | 377 | 432 | 404 | 170 | 159 | 166 |
| Hassan ibn Thabit Basic School for Boys | Marka Province | MoE | 391 | 416 | 404 | 150 | 178 | 167 |
| Manshyet Alsultah Secondary Mixed School | West North Badia | MoE | 369 | 438 | 404 | 184 | 153 | 168 |
| Alkhawarizmi Basic School for Boys | Zarqa 1st | MoE | 389 | 418 | 403 | 156 | 175 | 169 |
| Na'our Comprehensive Secondary School for Boys | Na'our Province | MoE | 381 | 425 | 403 | 165 | 166 | 170 |
| Juwayriyah Bint Alhareth Basic School for Girls | Rusiafah | MoE | 375 | 430 | 403 | 172 | 161 | 171 |
| Jawa First Secondary School for Boys | Qweismeh Province | MoE | 374 | 429 | 401 | 177 | 163 | 172 |
| Bilal bin Rabah Basic School for Boys | Marka Province | MoE | 377 | 424 | 401 | 169 | 168 | 173 |
| Um Alhieran First Secondary School for Boys | Qweismeh Province | MoE | 375 | 422 | 398 | 173 | 173 | 174 |
| Jameel Shaker Secondary School for Boys | Wadi Seer Province | MoE | 378 | 417 | 398 | 168 | 177 | 175 |
| Qafqafa Secondary School for Boys | Jerash | MoE | 369 | 422 | 396 | 183 | 172 | 176 |
| Belela Comprehensive Secondary Mixed School for Girls | Jerash | MoE | 374 | 414 | 394 | 174 | 179 | 177 |
| Albairooni First Basic School for Boys | Rusiafah | MoE | 380 | 404 | 392 | 166 | 188 | 178 |
| Ibn Khafajah Basic School for Boys | Zarqa 1st | MoE | 366 | 417 | 391 | 190 | 176 | 179 |
| Um Qseir Secondary Comprehensive Mixed School | Mid Badia / Aljeezah Province | MoE | 363 | 419 | 391 | 194 | 174 | 180 |
| Zaha' Eddin Alhamoud Comprehensive Secondary School for Boys | Bani Ebeid | MoE | 369 | 413 | 391 | 186 | 180 | 181 |
| Aqraba Comprehensive Secondary School for Boys | Bani Kenaneh | MoE | 371 | 409 | 390 | 182 | 181 | 182 |
| Zarqa' 1st Preparatory School for Boys | UNRWA-Zarqa' | UNRWA | 372 | 407 | 389 | 180 | 183 | 183 |

| | | | | | | | | |
|--|-------------------------------------|-------|-----|-----|-----|-----|-----|-----|
| Khalidiya Secondary Mixed School | West North Badia | MoE | 369 | 409 | 389 | 185 | 182 | 184 |
| Prince Abdullah Basic for Boys | Zarqa 1st | MoE | 374 | 402 | 388 | 176 | 191 | 185 |
| Almugheir Comprehensive Secondary School for Girls | Irbid Center | MoE | 366 | 407 | 387 | 189 | 185 | 186 |
| Alturrah Secondary School for Boys | Ramtha | MoE | 374 | 396 | 385 | 175 | 194 | 187 |
| Amman New Camp First Preparatory School for Males | UNRWA- Amman South | UNRWA | 365 | 404 | 385 | 191 | 186 | 188 |
| Sammou' Basic School for Boys | Alkourah | MoE | 363 | 404 | 384 | 193 | 187 | 189 |
| Alameen Basic School for Boys | Aljamaa' Province | MoE | 359 | 407 | 383 | 196 | 184 | 190 |
| Abdullah Ben Rawahah First Basic School for Boys | Amman Center | MoE | 368 | 398 | 383 | 187 | 193 | 191 |
| Ramtha Secondary School for Boys | Ramtha | MoE | 364 | 402 | 383 | 192 | 190 | 192 |
| Talha bin Obeid-Allah Basic School for Boys | Marka Province | MoE | 367 | 396 | 381 | 188 | 196 | 193 |
| Abdul Malik bin Marwan Secondary School for Boys | Marka Province | MoE | 362 | 399 | 381 | 195 | 192 | 194 |
| Alribat Mixed Secondary School | Zarqa 2nd | MoE | 357 | 404 | 380 | 198 | 189 | 195 |
| Alizz ibn Abd al-Salam Secondary School for Boys | Marka Province | MoE | 371 | 389 | 380 | 181 | 199 | 196 |
| Alhassan Albasri Basic for Boys | Marka Province | MoE | 372 | 385 | 378 | 179 | 203 | 197 |
| Alyoubeel Althahabi Secondary School for Boys | Marka Province | MoE | 359 | 394 | 377 | 197 | 197 | 198 |
| Alkindi Basic for Boys | Marka Province | MoE | 349 | 389 | 369 | 201 | 198 | 199 |
| Aljeezah Secondary Comprehensive Mixed School | Mid Badia / Aljeezah Province | MoE | 339 | 396 | 368 | 207 | 195 | 200 |
| Mu'tasim Basic for Boys | Marka Province | MoE | 351 | 384 | 367 | 200 | 204 | 201 |

| | | | | | | | | |
|--|--------------------------------|----------------|-----|-----|-----|-----|-----|-----|
| Alma'mooniah Eastern Basic School for Boys | Madaba | MoE | 349 | 386 | 367 | 202 | 201 | 202 |
| Yaqout Alhamwi Basic School for Boys | Zarqa 1st | MoE | 341 | 383 | 362 | 204 | 206 | 203 |
| Alfosfat Secondary School for Boys | Tafeeleh | MoE | 336 | 387 | 362 | 208 | 200 | 204 |
| North Shouneh Basic Mixed School for Boys | North Aghwar | MoE | 354 | 368 | 361 | 199 | 213 | 205 |
| Rehana Bint Zaid Secondary Mixed School | Zarqa 2nd | MoE | 340 | 381 | 361 | 206 | 207 | 206 |
| Sa'eed bin Musayyib Basic School for Boys | Zarqa 1st | MoE | 335 | 379 | 357 | 210 | 209 | 207 |
| Aseed bin Hudayer First Secondary School for Boys | Rusiafah | MoE | 330 | 384 | 357 | 211 | 205 | 208 |
| Alhusseiniya Secondary Comprehensive Mixed School | South Badia | MoE | 326 | 385 | 356 | 215 | 202 | 209 |
| Alshajarah Secondary School for Boys | Ramtha | MoE | 343 | 368 | 355 | 203 | 212 | 210 |
| Erainbah West Secondary School for Boys | Mid Badia / Aljeezah Province | MoE | 329 | 378 | 354 | 212 | 210 | 211 |
| Garandal Secondary School for Boys | Tafeeleh | MoE | 326 | 379 | 353 | 214 | 208 | 212 |
| Ein Al-Basha Secondary School for Boys | Ein Albasha | MoE | 336 | 368 | 352 | 209 | 211 | 213 |
| Abu Naseer Secondary School for Boys | Ein Albasha | MoE | 340 | 362 | 351 | 205 | 216 | 214 |
| Rasheed First Secondary School for Boys | Rusiafah | MoE | 324 | 367 | 345 | 218 | 214 | 215 |
| Altheibeh West Comprehensive Secondary School for Boys | Mid Badia/ Almuwaqqer Province | MoE | 322 | 363 | 343 | 219 | 215 | 216 |
| Mafrq Second Basic School for Boys | Mafrq Center | MoE | 319 | 357 | 338 | 220 | 217 | 217 |
| Um Aljmal West Comprehensive School for Boys | East North Badia | MoE | 317 | 356 | 336 | 221 | 218 | 218 |
| Almajar Basic Mixed School | Jerash | MOE | 326 | 346 | 336 | 216 | 221 | 219 |
| Ibn Alanbari Basic School for Boys | Zarqa 2nd | MoE | 325 | 342 | 333 | 217 | 222 | 220 |
| Alalamiah Second School for Boys / Airport Road | Wadi Seer Province | Private Sector | 327 | 339 | 333 | 213 | 224 | 221 |
| Ibn Hisham Basic School for Boys | Rusiafah | MoE | 310 | 352 | 331 | 222 | 220 | 222 |
| Dherar Secondary School for Boys | Deir Alla | MoE | 305 | 355 | 330 | 225 | 219 | 223 |

| | | | | | | | | |
|---|---------------|-----|-----|-----|-----|-----|-----|-----|
| Rasoon Comprehensive Secondary School for Boys | Ajloun | MoE | 309 | 338 | 324 | 223 | 225 | 224 |
| Khalid bin Waleed Basic School for Boys | Zarqa 1st | MoE | 306 | 335 | 320 | 224 | 227 | 225 |
| Muqbleh Basic School for Boys | Jerash | MoE | 293 | 335 | 314 | 226 | 226 | 226 |
| Umm Rummaneh Secondary School for Boys | Zarqa 2nd | MoE | 284 | 339 | 312 | 227 | 223 | 227 |
| Rawdhat Prince Mohammed Comprehensive Secondary School for Boys | Mafraq Center | MoE | 282 | 309 | 296 | 228 | 228 | 228 |
| Almashareh Secondary School for Boys | North Aghwar | MoE | 256 | 266 | 261 | 229 | 229 | 229 |
| Karima Secondary School for Boys | North Aghwar | MoE | 251 | 255 | 253 | 230 | 230 | 230 |

Annexes

Annex (1): Performance Averages and Schools Ranks in Math and Science and in both Subjects in TIMSS 2011

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|---|-----------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Patriarch Diodoros 1st | Aqaba | Private Sector | 553 | 596 | 575 | 1 | 1 | 1 |
| Amawi Neighborhood Secondary School | Amman Center | MoE | 532 | 586 | 559 | 5 | 2 | 2 |
| Islamic Scientific College / females / Jabal Amman | Amman Center | Private Sector | 533 | 563 | 548 | 4 | 5 | 3 |
| Alittihad / females / Tariq | Aljamaa' Province | Private Sector | 524 | 571 | 548 | 7 | 3 | 4 |
| Islamic Center Society Basic School – Jabal Alameerah Rahma | Zarqa 1 st | Private Sector | 528 | 566 | 547 | 6 | 4 | 5 |
| International Pioneers Academy / Secondary / males | Aljamaa' Province | Private Sector | 533 | 556 | 545 | 3 | 6 | 6 |
| University 1st School / males | Aljamaa' Province | Private Sector | 536 | 552 | 544 | 2 | 7 | 7 |
| Rosary / Shmeisani | Amman Center | Private Sector | 517 | 552 | 535 | 8 | 8 | 8 |
| Bint Uday Comprehensive Secondary Mixed School | Aljamaa' Province | MoE | 514 | 551 | 533 | 9 | 9 | 9 |
| Queen Noor Al Hussein Secondary / females | Amman Center | MoE | 492 | 537 | 515 | 13 | 11 | 10 |
| Roman Catholic School for Boys | Zarqa | Private Sector | 496 | 532 | 514 | 11 | 17 | 11 |
| National Orthodox / Alashrafieh | Amman Center | Private Sector | 499 | 528 | 513 | 10 | 20 | 12 |
| Nozha Females Preparatory fourth | UNRWA - North Amman | UNRWA | 493 | 533 | 513 | 12 | 15 | 13 |
| Alatheer Schools | Qweismeh Province | Private Sector | 487 | 537 | 512 | 15 | 12 | 14 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|---|--------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Prince Hamzah Bin Al Hussein | Wadi Seer Province | Private Sector | 484 | 539 | 511 | 20 | 10 | 15 |
| Tamadur bint Amr Basic School/ Girls | Zarqa 1st | MoE | 485 | 533 | 509 | 18 | 16 | 16 |
| Natefah Basic School/ Girls | Irbid Center | MoE | 484 | 527 | 506 | 19 | 21 | 17 |
| Alqusoor Preparatory School | UNRWA North Amman | UNRWA | 480 | 529 | 505 | 21 | 19 | 18 |
| Jandaweel Comprehensive Secondary School /Girls | Wadi Seer Province | MoE | 485 | 524 | 505 | 17 | 23 | 19 |
| Cordoba International | Qweismeh Province | Private Sector | 486 | 521 | 503 | 16 | 25 | 20 |
| Modern Education | Marka Province | Private Sector | 471 | 530 | 500 | 29 | 18 | 21 |
| Mansheya Comprehensive Secondary School for Girls | Kerak Center | MoE | 466 | 534 | 500 | 32 | 14 | 22 |
| Hafsa bint Omar Basic School for Girls | Ramtha | MoE | 478 | 518 | 498 | 25 | 26 | 23 |
| Alzuhoor Preparatory School for Females | UNRWA Amman South | UNRWA | 474 | 521 | 498 | 28 | 24 | 24 |
| Abdullah bin Qais Al-Harthi Basic School for Boys | Aqaba | MoE | 477 | 518 | 497 | 26 | 27 | 25 |
| Der Latins (National Patriarchate School | Marka Province | Private Sector | 480 | 512 | 496 | 22 | 32 | 26 |
| Hussein Preparatory School for Females | UNRWA-Amman North | UNRWA | 455 | 536 | 495 | 48 | 13 | 27 |
| Qadisiyah Mixed Secondary School | Bseirah Province | MoE | 463 | 527 | 495 | 37 | 22 | 28 |
| Alaal Secondary Comprehensive School for Boys | Irbid Center | MoE | 479 | 507 | 493 | 23 | 36 | 29 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|--|--------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Alnukhbeh / males | Aljamaa' Province | Private Sector | 488 | 497 | 492 | 14 | 53 | 30 |
| Princess Rahma Bint El Hassan Basic School for Girls | Amman Center | MoE | 476 | 506 | 491 | 27 | 39 | 31 |
| Swaileh Preparatory School for Males | UNRWA-Amman North | UNRWA | 463 | 518 | 490 | 40 | 28 | 32 |
| Halle Bint Khuweiled Secondary School for Girls | Salt Center | MoE | 465 | 515 | 490 | 35 | 29 | 33 |
| Albaqa' Seond Preparatory School for Males | UMRWA-Amman North | UNRWA | 478 | 502 | 490 | 24 | 45 | 34 |
| Umm Habiba Secondary School For Girls | Wadi Seer Province | MoE | 462 | 515 | 488 | 41 | 30 | 35 |
| Alhashemi Second Preparatory School for Males | UNRWA-Amman North | UNRWA | 462 | 511 | 486 | 42 | 34 | 36 |
| Altanweer Private School | Qweismeh Province | Private Sector | 458 | 511 | 485 | 44 | 33 | 37 |
| Irbid Model Secondary Mixed School | Irbid Center | Private Sector | 463 | 506 | 484 | 38 | 41 | 38 |
| Sakhrah Comprehensive Secondary School for Boys | Ajloun | MoE | 464 | 505 | 484 | 36 | 42 | 39 |
| Faisal 1st Basic School for Boys | Aqaba | MoE | 469 | 499 | 484 | 30 | 51 | 40 |
| Aljazae'r Basic School for Females | Amman Center | MoE | 465 | 498 | 482 | 33 | 52 | 41 |
| Western Shmeisani Basic School for Girls | Amman Center | MoE | 457 | 506 | 481 | 46 | 40 | 42 |
| Nozha Third Preparatory for Males | UNRWA-Amman North | UNRWA | 455 | 507 | 481 | 47 | 38 | 43 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|--|-------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Marka Second Preparatory School for Females | UNRWA-Zarqa' | UNRWA | 452 | 510 | 481 | 52 | 35 | 44 |
| Um Manei' Basic Mixed School | Aljamaa' Province | MoE | 458 | 504 | 481 | 45 | 43 | 45 |
| Khalda Comprehensive Secondary School for Girls | Aljamaa' Province | MoE | 459 | 502 | 481 | 43 | 46 | 46 |
| Waqas Females Preparatory School | UNRWA-Irbid | UNRWA | 446 | 513 | 480 | 59 | 31 | 47 |
| Deir Abi Sa'eed Comprehensive Secondary School for Girls | Alkourah | MoE | 451 | 507 | 479 | 53 | 37 | 48 |
| Alkhader Modern Schools | Marka Province | Private Sector | 463 | 494 | 478 | 39 | 55 | 49 |
| Marka Fourth Preparatory School for Females | UNRWA-Zarqa' | UNRWA | 465 | 491 | 478 | 34 | 61 | 50 |
| Umm Kulthum Comprehensive Secondary School | Zarqa 1st | MoE | 453 | 500 | 476 | 50 | 47 | 51 |
| Zaid bin Haritha Secondary School for Boys | Kerak Center | MoE | 452 | 499 | 476 | 51 | 48 | 52 |
| Israa' Basic School for Girls | Amman Center | MoE | 451 | 499 | 475 | 54 | 50 | 53 |
| Scientific Reyadah School | Aljamaa' Province | Private Sector | 466 | 481 | 474 | 31 | 82 | 54 |
| Erwiem Secondary School for Girls | Tafeeleh | MoE | 442 | 503 | 473 | 65 | 44 | 55 |
| Saham Mixed Secondary Comprehensive | Bani Kenaneh | MoE | 446 | 499 | 472 | 60 | 49 | 56 |
| Waqas Males Preparatory School | UNRWA-Irbid | UNRWA | 454 | 485 | 470 | 49 | 66 | 57 |
| Kufur Ebeil Comprehensive Secondary School for Girls | Alkourah | MoE | 441 | 497 | 469 | 67 | 54 | 58 |
| Nahawand Basic Mixed | Ramtha | MoE | 445 | 493 | 469 | 63 | 56 | 59 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|---|-----------------------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Qmeim Comprehensive Secondary School for Boys | Altaibeh and Alwasteyeh Provinces | MoE | 449 | 486 | 468 | 55 | 62 | 60 |
| Oxford | Aljamaa' Province | Private Sector | 442 | 492 | 467 | 66 | 58 | 61 |
| Alhashemi First Preparatory School for Females | UNRWA-Amman North | UNRWA | 445 | 483 | 464 | 61 | 71 | 62 |
| Sakeb Comprehensive Secondary School for Boys | Jerash | MoE | 447 | 482 | 464 | 57 | 77 | 63 |
| Abu Bakr Basic School for Boysl | Irbid Center | MoE | 449 | 479 | 464 | 56 | 86 | 64 |
| Angara basic School for Boys | Ajloun | MoE | 446 | 481 | 463 | 58 | 83 | 65 |
| Enbeh Secondary Comprehensive School for Boys | North Mazar Province | MoE | 444 | 483 | 463 | 64 | 73 | 66 |
| Huwara Basic School for Girls. | Irbid Center | MoE | 432 | 491 | 462 | 83 | 59 | 67 |
| Nahawand basic mixed | Zarqa 1st | MoE | 441 | 482 | 461 | 68 | 75 | 68 |
| Albaqa' First Preparatory School for Females | UNRWA-Amman North | UNRWA | 430 | 493 | 461 | 84 | 57 | 69 |
| Um Aljmal Secondary Comprehensive Mixed School | East North Badia | MoE | 437 | 486 | 461 | 73 | 63 | 70 |
| Mahes Secondary School for Girls | Salt Center | MoE | 438 | 485 | 461 | 71 | 67 | 71 |
| Thaher Alsaroo Comprehensive Secondary School for Girls | Jerash | MoE | 438 | 482 | 460 | 70 | 76 | 72 |
| Alkhansa' Secondary Comprehensive Mixed School | Aljamaa' Province | MoE | 434 | 485 | 460 | 78 | 65 | 73 |
| Thaher Alsaroo Basic School for Boys | Jerash | MoE | 439 | 480 | 459 | 69 | 84 | 74 |
| Zabbud Basic Mixed School | Na'our Province | MoE | 433 | 485 | 459 | 81 | 64 | 75 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|--|--------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Martyer Faisal 2nd College | Military Education | Ministry of Defense | 434 | 484 | 459 | 79 | 69 | 76 |
| Albaqa' third Preparatory School for Males | UNRWA-Amman North | UNRWA | 436 | 482 | 459 | 75 | 78 | 77 |
| Dar ALSalaam Secondary Mixed School | Marka Province | MoE | 435 | 483 | 459 | 77 | 72 | 78 |
| Queen Zein Al Sharaf School Comprehensive Secondary School for Girls | Aqaba | MoE | 435 | 481 | 458 | 76 | 81 | 79 |
| Abu Bakr Basic School for Boys | Mafrq Center | MoE | 433 | 482 | 458 | 82 | 74 | 80 |
| Zmal Secondary Comprehensive Mixed | Alkourah | MoE | 433 | 481 | 457 | 80 | 80 | 81 |
| Princess Alia Bint Al Hussein Secondary Mixed School | Mafrq Center | MoE | 424 | 491 | 457 | 93 | 60 | 82 |
| AlRusaifa first female Preparatory School | UNRWA-Zarqa' | UNRWA | 436 | 478 | 457 | 74 | 89 | 83 |
| Nusseibeh Bint Ka'eb Basic School for Females | Amman Center | MoE | 428 | 484 | 456 | 86 | 70 | 84 |
| Alrmeimeen Secondary School for Girls | Salt Center | MoE | 427 | 485 | 456 | 87 | 68 | 85 |
| Yadodeh First Secondary School for Boys | Qweismeh Province | MoE | 429 | 479 | 454 | 85 | 85 | 86 |
| Aljadeedah Secondary School for Boys | Kerak Center | MoE | 445 | 461 | 453 | 62 | 112 | 87 |
| Greek Orthodox Secondary School - Fuhais | Salt Center | Private Sector | 437 | 468 | 452 | 72 | 99 | 88 |
| Tamadur bint Amr First Secondary School for Girls | Rusiafah | MoE | 421 | 482 | 451 | 99 | 79 | 89 |
| Almanahel Secondary School | Zarqa | Private Sector | 421 | 478 | 450 | 97 | 87 | 90 |
| Khaleda Qurashiyah Secondary Mixed School | Salt Center | MoE | 419 | 478 | 448 | 105 | 88 | 91 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|--|-------------------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Amman New Camp 2nd Preparatory School for Females | UNRWA-Amman South | UNRWA | 419 | 477 | 448 | 104 | 90 | 92 |
| Bushra Secondary Comprehensive Mixed School | Irbid Center | MoE | 421 | 474 | 448 | 98 | 92 | 93 |
| Fatima Alzahra' Comprehensive Secondary School for Girls | West North Badia | MoE | 418 | 475 | 447 | 106 | 91 | 94 |
| Allan Secondary School for Girls | Salt Center | MoE | 422 | 470 | 446 | 96 | 95 | 95 |
| Rajeb Comprehensive Secondary School for Girls | Ajloun | MoE | 425 | 468 | 446 | 89 | 100 | 96 |
| Aisha Albaoniah Secondary Comprehensive for Girls | Zarqa 1st | MoE | 423 | 469 | 446 | 94 | 96 | 97 |
| Ali Redha Alrikabi Basic School for Boys | Aljamaa' Province | MoE | 424 | 467 | 446 | 92 | 101 | 98 |
| Juwaideh Secondary School for Girls | Qweismeh Province | MoE | 425 | 466 | 446 | 90 | 102 | 99 |
| Zarqa' Alyamamah Basic School for Girls | Zarqa | MoE | 426 | 464 | 445 | 88 | 106 | 100 |
| Fatima Alzahra Basic Mixed | Jerash | MoE | 415 | 473 | 444 | 110 | 93 | 101 |
| Almuaqquer Comprehensive Secondary School for Girls | Mid Badia / Muaqquer Province | MoE | 410 | 473 | 441 | 119 | 94 | 102 |
| Jaber Bin Hayyan Basic School for Boys | Rusiafah | MoE | 425 | 457 | 441 | 91 | 117 | 103 |
| Husniyah First Secondary School for Girls | Qweismeh Province | MoE | 412 | 468 | 440 | 116 | 97 | 104 |
| Saffanah Bint Hatem First Secondary School for Girls | Marka Province | MoE | 417 | 463 | 440 | 108 | 107 | 105 |
| Jubaiha Secondary School for Boys | Aljamaa' Province | MoE | 418 | 461 | 439 | 107 | 111 | 106 |
| Sakib Comprehensive Secondary School for Girls | Jerash | MoE | 412 | 462 | 437 | 113 | 110 | 107 |
| Abu Huraira Basic School for Boys | Amman Center | MoE | 419 | 454 | 437 | 103 | 122 | 108 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|---|--------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Hatem Comprehensive Secondary School for Girls | Bani Kenaneh | MoE | 408 | 465 | 437 | 121 | 103 | 109 |
| Ruqayyah Bint Alrasool Secondary Mixed School | Amman Center | MoE | 407 | 464 | 436 | 123 | 105 | 110 |
| Allfarouk Secondary School for Boys | Wadi Seer Province | MoE | 421 | 451 | 436 | 100 | 130 | 111 |
| Zaid bin Haritha Secondary School for Boys | Salt Center | MoE | 411 | 460 | 436 | 117 | 113 | 112 |
| Prince Rashid Basic School for Boys | Amman Center | MoE | 423 | 448 | 435 | 95 | 135 | 113 |
| Jabal Amman Basic School for Girls | Amman Center | MoE | 412 | 458 | 435 | 115 | 115 | 114 |
| Marka 1st Preparatory School for Males | UNRWA-Zarqa' | UNRWA | 420 | 447 | 433 | 102 | 140 | 115 |
| Albara' bin Malik Secondary School For Boys | Na'our Province | MoE | 420 | 446 | 433 | 101 | 141 | 116 |
| Amenah Bint Alarqam Basic for females | Zarqa 1st | MoE | 401 | 464 | 433 | 133 | 104 | 117 |
| Alfadeen Basic Mixed School | Mafraq Center | MoE | 398 | 468 | 433 | 139 | 98 | 118 |
| Alsafwah Model Basic Mixed School | Mafraq Center | Private Sector | 416 | 450 | 433 | 109 | 132 | 119 |
| Ebein Eblien Comprehensive Secondary School for Girls | Mafraq Center | MoE | 408 | 458 | 433 | 122 | 116 | 120 |
| Mastabeh Comprehensive Secondary School for Girls | Jerash | MoE | 411 | 454 | 432 | 118 | 124 | 121 |
| Almanarah Basic Mixed | Marka Province | MoE | 404 | 460 | 432 | 127 | 114 | 122 |
| Um Ma'abad Secondary School for Girls | Amman Center | MoE | 412 | 452 | 432 | 111 | 128 | 123 |
| Bader Alkubrah Comprehensive Secondary School for Girls | Zarqa 1st | MoE | 401 | 462 | 432 | 134 | 109 | 124 |
| Umm Shuraik Alansariyeh Secondary Mixed School | Zarqa 2nd | MoE | 399 | 462 | 431 | 136 | 108 | 125 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|--|--------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Irbid City 3rd Preparatory School | UNRWA-Irbid | UNRWA | 405 | 455 | 430 | 126 | 119 | 126 |
| Hadeeqat Tunis Basic Mixed School | Irbid Center | MoE | 408 | 451 | 430 | 120 | 129 | 127 |
| Yarmouk Secondary School for Girls | Amman Center | MoE | 402 | 454 | 428 | 130 | 123 | 128 |
| Naifeh Secondary School for Girls | Marka Province | MoE | 402 | 453 | 427 | 132 | 125 | 129 |
| Irbid City 3rd Preparatory School for Males | UNRWA-Irbid | UNRWA | 412 | 441 | 426 | 112 | 151 | 130 |
| Mobes Secondary Mixed School | Ein Albasha | MoE | 405 | 447 | 426 | 125 | 139 | 131 |
| Nusseibah Almazeniah Basic School for girls | Rusiafah | MoE | 404 | 446 | 425 | 128 | 142 | 132 |
| Um Albasateen Secondary School for Girls | Na'our Province | MoE | 398 | 451 | 425 | 137 | 131 | 133 |
| Sakhrah Comprehensive Secondary School for Girls | Ajloun | MoE | 395 | 453 | 424 | 146 | 126 | 134 |
| Princess Haya Bint Al Hussein Basic Mixed School | Na'our Province | MoE | 396 | 452 | 424 | 145 | 127 | 135 |
| Alashrafieh Secondary School for Girls | Amman Center | MoE | 393 | 455 | 424 | 149 | 120 | 136 |
| Um Alamad Basic School for Boys | Salt Center | MoE | 403 | 444 | 424 | 129 | 146 | 137 |
| Petra Basic Mixed School | Amman Center | MoE | 397 | 449 | 423 | 143 | 134 | 138 |
| Alqimmah 2nd School | Wadi Seer Province | Private Sector | 407 | 439 | 423 | 124 | 152 | 139 |
| Princess Taghreed Secondary exploratory Mixed School | Qweismeh Province | MoE | 390 | 456 | 423 | 153 | 118 | 140 |
| Althleil Secondary Comprehensive Mixed School | Zarqa 2nd | MoE | 397 | 448 | 422 | 144 | 136 | 141 |
| Rusaifa 3rd Preparatory School for Males | UNRWA-Zarqa' | UNRWA | 400 | 444 | 422 | 135 | 145 | 142 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|---|--------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Kafr Almaa' Comprehensive Secondary School for Girls | Alkourah | MoE | 397 | 447 | 422 | 142 | 138 | 143 |
| Thaghret Aljubb Comprehensive Secondary School for Boys | West North Badia | MoE | 402 | 441 | 421 | 131 | 150 | 144 |
| Um Amarah Secondary School for Girls | Sahab Province | MoE | 391 | 450 | 420 | 151 | 133 | 145 |
| Ekremah Secondary School for Boys | Zarqa 2nd | MoE | 412 | 428 | 420 | 114 | 164 | 146 |
| Abu Alanda Secondary School for Girls | Qweismeh Province | MoE | 385 | 455 | 420 | 163 | 121 | 147 |
| Omar Almukhtar Basic for Boys | Irbid Center | MoE | 398 | 441 | 419 | 141 | 149 | 148 |
| Alhashemiah Secondary School for Girls | Aqaba | MoE | 393 | 445 | 419 | 148 | 143 | 149 |
| Ajnadeen Basic School for Girls | Irbid Center | MoE | 388 | 447 | 418 | 160 | 137 | 150 |
| Shajaret Aldurr Basic School for Girls | Amman Center | MoE | 388 | 445 | 416 | 159 | 144 | 151 |
| Amrawah Secondary School for Boys | Ramtha | MoE | 398 | 435 | 416 | 138 | 156 | 152 |
| Shukri Sha'sha'a Secondary School for Boys | Amman Center | MoE | 395 | 435 | 415 | 147 | 155 | 153 |
| Jerash Camp ist Preparatory School for Boys | UNRWA-Irbid | UNRWA | 389 | 435 | 412 | 155 | 154 | 154 |
| Alazraq Secondary Mixed School | Zarqa 2nd | MoE | 379 | 443 | 411 | 167 | 147 | 155 |
| Abu Obeida Basic School for Boys | Marka Province | MoE | 398 | 424 | 411 | 140 | 169 | 156 |
| Akka Basic School for Girls | Irbid Center | MoE | 390 | 430 | 410 | 152 | 162 | 157 |
| Marj Alhamam Secondary School for Boys | Wadi Seer Province | MoE | 388 | 431 | 410 | 158 | 160 | 158 |
| Aliskan Secondary Mixed School | Ma'an | MoE | 382 | 434 | 408 | 164 | 157 | 159 |
| Der Alliyat Comprehensive Secondary School for Girls | Jerash | MoE | 373 | 443 | 408 | 178 | 148 | 160 |
| Prince Talal Basic School for Boys | Zarqa 1st | MoE | 389 | 424 | 406 | 157 | 167 | 161 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|---|--------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Ebein Basic School for Boys | Ajloun | MoE | 390 | 423 | 406 | 154 | 171 | 162 |
| Hariemah Comprehensive Secondary School for Boys | Bani Kenaneh | MoE | 385 | 427 | 406 | 162 | 165 | 163 |
| Alashrafieh 2nd Preparatory School for boys | UNRWA-Amman South | UNRWA | 386 | 424 | 405 | 161 | 170 | 164 |
| Qweismeh Secondary School for Girls | Qweismeh Province | MoE | 376 | 433 | 405 | 171 | 158 | 165 |
| Almabrookeh Comprehensive Secondary School for Girls | West North Badia | MoE | 377 | 432 | 404 | 170 | 159 | 166 |
| Hassan ibn Thabit Basic School for Boys | Marka Province | MoE | 391 | 416 | 404 | 150 | 178 | 167 |
| Manshyet Alsultah Secondary Mixed School | West North Badia | MoE | 369 | 438 | 404 | 184 | 153 | 168 |
| Alkhawarizmi Basic School for Boys | Zarqa 1st | MoE | 389 | 418 | 403 | 156 | 175 | 169 |
| Na'our Comprehensive Secondary School for Boys | Na'our Province | MoE | 381 | 425 | 403 | 165 | 166 | 170 |
| Juwayriyah Bint Alhareth Basic School for Girls | Rusiafah | MoE | 375 | 430 | 403 | 172 | 161 | 171 |
| Jawa First Secondary School for Boys | Qweismeh Province | MoE | 374 | 429 | 401 | 177 | 163 | 172 |
| Bilal bin Rabah Basic School for Boys | Marka Province | MoE | 377 | 424 | 401 | 169 | 168 | 173 |
| Um Alhieran First Secondary School for Boys | Qweismeh Province | MoE | 375 | 422 | 398 | 173 | 173 | 174 |
| Jameel Shaker Secondary School for Boys | Wadi Seer Province | MoE | 378 | 417 | 398 | 168 | 177 | 175 |
| Qafqafa Secondary School for Boys | Jerash | MoE | 369 | 422 | 396 | 183 | 172 | 176 |
| Belela Comprehensive Secondary Mixed School for Girls | Jerash | MoE | 374 | 414 | 394 | 174 | 179 | 177 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|--|-------------------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Albairooni First Basic School for Boys | Rusiafah | MoE | 380 | 404 | 392 | 166 | 188 | 178 |
| Ibn Khafajah Basic School for Boys | Zarqa 1st | MoE | 366 | 417 | 391 | 190 | 176 | 179 |
| Um Qseir Secondary Comprehensive Mixed School | Mid Badia / Aljeezah Province | MoE | 363 | 419 | 391 | 194 | 174 | 180 |
| Zaha' Eddin Alhamoud Comprehensive Secondary School for Boys | Bani Ebeid | MoE | 369 | 413 | 391 | 186 | 180 | 181 |
| Aqraba Comprehensive Secondary School for Boys | Bani Kenaneh | MoE | 371 | 409 | 390 | 182 | 181 | 182 |
| Zarqa' 1st Preparatory School for Boys | UNRWA-Zarqa' | UNRWA | 372 | 407 | 389 | 180 | 183 | 183 |
| Khalidiya Secondary Mixed School | West North Badia | MoE | 369 | 409 | 389 | 185 | 182 | 184 |
| Prince Abdullah Basic for Boys | Zarqa 1st | MoE | 374 | 402 | 388 | 176 | 191 | 185 |
| Almugheir Comprehensive Secondary School for Girls | Irbid Center | MoE | 366 | 407 | 387 | 189 | 185 | 186 |
| Alturrah Secondary School for Boys | Ramtha | MoE | 374 | 396 | 385 | 175 | 194 | 187 |
| Amman New Camp First Preparatory School for Males | UNRWA-Amman South | UNRWA | 365 | 404 | 385 | 191 | 186 | 188 |
| Sammou' Basic School for Boys | Alkourah | MoE | 363 | 404 | 384 | 193 | 187 | 189 |
| Alameen Basic School for Boys | Aljamaa' Province | MoE | 359 | 407 | 383 | 196 | 184 | 190 |
| Abdullah Ben Rawahah First Basic School for Boys | Amman Center | MoE | 368 | 398 | 383 | 187 | 193 | 191 |
| Ramtha Secondary School for Boys | Ramtha | MoE | 364 | 402 | 383 | 192 | 190 | 192 |
| Talha bin Obeid-Allah Basic School for Boys | Marka Province | MoE | 367 | 396 | 381 | 188 | 196 | 193 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|---|-------------------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Abdul Malik bin Marwan Secondary School for Boys | Marka Province | MoE | 362 | 399 | 381 | 195 | 192 | 194 |
| Alribat Mixed Secondary School | Zarqa 2nd | MoE | 357 | 404 | 380 | 198 | 189 | 195 |
| Alizz ibn Abd al-Salam Secondary School for Boys | Marka Province | MoE | 371 | 389 | 380 | 181 | 199 | 196 |
| Alhassan Albasri Basic for Boys | Marka Province | MoE | 372 | 385 | 378 | 179 | 203 | 197 |
| Alyoubeel Althahabi Secondary School for Boys | Marka Province | MoE | 359 | 394 | 377 | 197 | 197 | 198 |
| Alkindi Basic for Boys | Marka Province | MoE | 349 | 389 | 369 | 201 | 198 | 199 |
| Aljeezah Secondary Comprehensive Mixed School | Mid Badia / Aljeezah Province | MoE | 339 | 396 | 368 | 207 | 195 | 200 |
| Mu'tasim Basic for Boys | Marka Province | MoE | 351 | 384 | 367 | 200 | 204 | 201 |
| Alma'mooniah Eastern Basic School for Boys | Madaba | MoE | 349 | 386 | 367 | 202 | 201 | 202 |
| Yaqout Alhamwi Basic School for Boys | Zarqa 1st | MoE | 341 | 383 | 362 | 204 | 206 | 203 |
| Alfosfat Secondary School for Boys | Tafeeleh | MoE | 336 | 387 | 362 | 208 | 200 | 204 |
| North Shouneh Basic Mixed School for Boys | North Aghwar | MoE | 354 | 368 | 361 | 199 | 213 | 205 |
| Rehana Bint Zaid Secondary Mixed School | Zarqa 2nd | MoE | 340 | 381 | 361 | 206 | 207 | 206 |
| Sa'eed bin Musayyib Basic School for Boys | Zarqa 1st | MoE | 335 | 379 | 357 | 210 | 209 | 207 |
| Aseed bin Hudayer First Secondary School for Boys | Rusiafah | MoE | 330 | 384 | 357 | 211 | 205 | 208 |
| Alhusseiniya Secondary Comprehensive Mixed School | South Badia | MoE | 326 | 385 | 356 | 215 | 202 | 209 |
| Alshajarah Secondary School for Boys | Ramtha | MoE | 343 | 368 | 355 | 203 | 212 | 210 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|---|--------------------------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Erainbah West Secondary School for Boys | Mid Badia / Aljeezah Province | MoE | 329 | 378 | 354 | 212 | 210 | 211 |
| Garandal Secondary School for Boys | Tafeeleh | MoE | 326 | 379 | 353 | 214 | 208 | 212 |
| Ein Al-Basha Secondary School for Boys | Ein Albasha | MoE | 336 | 368 | 352 | 209 | 211 | 213 |
| Abu Naseer Secondary School for Boys | Ein Albasha | MoE | 340 | 362 | 351 | 205 | 216 | 214 |
| Rasheed First Secondary School for Boys | Rusiafah | MoE | 324 | 367 | 345 | 218 | 214 | 215 |
| Altheibeh West Comprehensive Secondary School for Boys | Mid Badia/ Almuwaqqer Province | MoE | 322 | 363 | 343 | 219 | 215 | 216 |
| Mafrq Second Basic School for Boys | Mafrq Center | MoE | 319 | 357 | 338 | 220 | 217 | 217 |
| Um Aljmal West Comprehensive School for Boys | East North Badia | MoE | 317 | 356 | 336 | 221 | 218 | 218 |
| Almajar Basic Mixed School | Jerash | MOE | 326 | 346 | 336 | 216 | 221 | 219 |
| Ibn Alanbari Basic School for Boys | Zarqa 2nd | MoE | 325 | 342 | 333 | 217 | 222 | 220 |
| Alalamiah Second School for Boys / Airport Road | Wadi Seer Province | Private Sector | 327 | 339 | 333 | 213 | 224 | 221 |
| Ibn Hisham Basic School for Boys | Rusiafah | MoE | 310 | 352 | 331 | 222 | 220 | 222 |
| Dherar Secondary School for Boys | Deir Alla | MoE | 305 | 355 | 330 | 225 | 219 | 223 |
| Rasoon Comprehensive Secondary School for Boys | Ajloun | MoE | 309 | 338 | 324 | 223 | 225 | 224 |
| Khalid bin Waleed Basic School for Boys | Zarqa 1st | MoE | 306 | 335 | 320 | 224 | 227 | 225 |
| Muqbleh Basic School for Boys | Jerash | MoE | 293 | 335 | 314 | 226 | 226 | 226 |
| Umm Rummaneh Secondary School for Boys | Zarqa 2nd | MoE | 284 | 339 | 312 | 227 | 223 | 227 |
| Rawdhat Prince Mohammed Comprehensive Secondary School for Boys | Mafrq Center | MoE | 282 | 309 | 296 | 228 | 228 | 228 |

| School | Directorate | Supervising Authority | Average | | | Rank | | |
|--------------------------------------|--------------|-----------------------|---------|---------|---------------|------|---------|---------------|
| | | | Math | Science | Both Subjects | Math | Science | Both Subjects |
| Almashareh Secondary School for Boys | North Aghwar | MoE | 256 | 266 | 261 | 229 | 229 | 229 |
| Karima Secondary School for Boys | North Aghwar | MoE | 251 | 255 | 253 | 230 | 230 | 230 |

Annex (2): Performance Averages and Directorates Ranks in Math and Science and in both Subjects in TIMSS 2011

| Directorate | Average | | | Rank | | | No. of Schools |
|-----------------------------------|---------|---------|---------------|------|---------|---------------|----------------|
| | Math | Science | Both Subjects | Math | Science | Both Subjects | |
| Bseirah Province | 463 | 527 | 495 | 1 | 1 | 1 | 1 |
| UNRWA- Amman North | 460 | 509 | 485 | 2 | 2 | 2 | 10 |
| Kerak Center | 454 | 498 | 476 | 3 | 3 | 3 | 3 |
| Altaibeh and Alwasteyeh Provinces | 449 | 486 | 468 | 4 | 4 | 4 | 1 |
| Aqaba | 443 | 486 | 465 | 5 | 6 | 5 | 5 |
| North Mazar Province | 444 | 483 | 463 | 7 | 5 | 6 | 1 |
| Aljamaa' Province | 438 | 482 | 460 | 8 | 7 | 7 | 13 |
| Military Education | 434 | 484 | 459 | 6 | 8 | 8 | 1 |
| Salt Center | 426 | 477 | 452 | 9 | 11 | 9 | 8 |
| Amman Center | 429 | 474 | 451 | 10 | 9 | 10 | 21 |
| Wadi Seer Province | 427 | 468 | 447 | 11 | 10 | 11 | 8 |
| UNRWA-Irbid | 421 | 466 | 444 | 13 | 14 | 12 | 5 |
| UNRWA- Zarqa' | 424 | 463 | 444 | 15 | 12 | 13 | 6 |

| Directorate | Average | | | Rank | | | No. of Schools |
|--------------------|---------|---------|---------------|------|---------|---------------|----------------|
| | Math | Science | Both Subjects | Math | Science | Both Subjects | |
| Irbid Center | 422 | 465 | 444 | 14 | 13 | 14 | 11 |
| Alkourah | 417 | 467 | 442 | 12 | 15 | 15 | 5 |
| UNRWA- Amman South | 411 | 457 | 434 | 16 | 16 | 16 | 4 |
| Na'our Province | 406 | 452 | 429 | 17 | 17 | 17 | 5 |
| Bani Kenaneh | 402 | 450 | 426 | 19 | 19 | 18 | 4 |
| Ajloun | 405 | 446 | 426 | 21 | 18 | 19 | 7 |
| Qweismeh Province | 396 | 451 | 423 | 18 | 21 | 20 | 11 |
| Sahab Province | 391 | 450 | 420 | 20 | 23 | 21 | 1 |
| Ramtha | 401 | 437 | 419 | 24 | 20 | 22 | 7 |
| Zarqa 1st | 395 | 438 | 416 | 23 | 22 | 23 | 17 |
| Jerash | 391 | 436 | 413 | 25 | 24 | 24 | 11 |
| West North Badia | 387 | 439 | 413 | 22 | 25 | 25 | 5 |
| Ma'an | 382 | 434 | 408 | 26 | 27 | 26 | 1 |
| Marka Province | 382 | 418 | 400 | 30 | 26 | 27 | 17 |

| Directorate | Average | | | Rank | | | No. of Schools |
|--------------------------------|---------|---------|---------------|------|---------|---------------|----------------|
| | Math | Science | Both Subjects | Math | Science | Both Subjects | |
| East North Badia | 377 | 421 | 399 | 29 | 28 | 28 | 2 |
| Mafrq Center | 371 | 422 | 396 | 28 | 29 | 29 | 6 |
| Tafeeleh | 368 | 423 | 396 | 27 | 31 | 30 | 3 |
| Mid Badia/ Almuwaqqer Province | 366 | 418 | 392 | 31 | 33 | 31 | 2 |
| Bani Ebeid | 369 | 413 | 391 | 32 | 30 | 32 | 1 |
| Rusiafah | 366 | 411 | 389 | 33 | 32 | 33 | 7 |
| Zarqa 2nd | 362 | 406 | 384 | 34 | 34 | 34 | 8 |
| Ein Albasha | 361 | 392 | 376 | 36 | 35 | 35 | 3 |
| Mid Badia / Aljeezah Province | 344 | 398 | 371 | 35 | 37 | 36 | 3 |
| Madaba | 349 | 386 | 367 | 37 | 36 | 37 | 1 |
| South Badia | 326 | 385 | 356 | 38 | 38 | 38 | 1 |
| Deir Alla | 305 | 355 | 330 | 39 | 39 | 39 | 1 |
| North Aghwar | 287 | 296 | 292 | 40 | 40 | 40 | 3 |

Annex (3): Future Steps

The next steps can be summed up in the preparations to participate in international study throughout the duration of the study. This means identifying the study population and providing it with the appropriate training. For example, Jordan will participate in TIMSS 2015 and PISA 2015. The required data will be collected for TIMSS in April, and in May for PISA, and the population for these studies can be identified as follows :

- Regarding TIMSS, the study population participating in the study is now in grade six. Regarding PISA, the study population is now in grade eight. Therefore, the training period should be organized as follows:

| | TIMSS | PISA |
|-------------------------------|--------------|-------------|
| 2012/2013 The second semester | Grade 6 | Grade 8 |
| 2013/2014 | Grade 7 | Grade 9 |
| 2014/2015 | Grade 8 | Grade 10 |

- Questions of the previous sessions of TIMSS and PISA, that are allowed to be revealed, are classified by grades, subject content and mental skill, and then are employed in the teaching process and in the quizzes and exams.
- Taking advantage of the guides prepared by the centre in previous sessions and employing them in teaching and testing.
- Introducing the questions of international tests in the new editions of textbooks and giving attention to such questions.
- Presenting the results of recent studies on the directorate level to provide awareness on the relevance of these studies.
- Training a team from the Ministry of Education on TIMSS and PISA studies to transfer this experience to the directorates, schools, teachers, students and the local community.
- Providing the Ministry of questions with the Arabic version of questions in previous sessions, that are allowed to be revealed, and classifying them by content and mental skills.
- Preparing a guide of PISA 2009.
- Preparing a guide of TIMSS 2011.
- Developing an incentive system at the levels of the teachers, students, principals, schools, and directorates to ensure serious participation in the study as well as constructive competition among all participants.
- Conducting a pilot test prior to every international study to make the study population familiar with the test.

Training:

- Establishing a unit at the Educational Training Center to be responsible for the international tests profile and to follow up the implementation of the procedural plans prepared by the Ministry.

- Including international tests activities in the training programs materials.
- Informing supervisors on different models of previous sessions' questions as well as discussing these questions with teachers during training and the evaluation process.
- Including the international test questions in questions referred to by teachers during training and testing.
- Enhancing oriented training to take advantage of international tests, and institutionalizing this training starting from grades six and seven for the next session.

Curriculum:

- Attempting to include samples of questions as activities or enrichment questions in the evaluation sections in the Math textbooks.
- Developing a brochure on TIMSS questions and providing the answers for a part of the questions, whereas discussing the other part during the remedial and enrichment classes.

The Media:

- Developing a media plan at the schools' level to provide awareness for students, teachers and parents on international and national studies.
- Developing a proposal on providing incentives for students, teachers, principals and supervisors of schools whose students obtain good results.

Annex (4)

Derived Indicators and Relevant Items

| Indicators | Item Code | Item |
|--|-----------|--|
| Students' Economic and Social Level (Students' Questionnaire) | BSBG05B | A desk |
| | BSBG05E | Internet |
| | BSBG05F | Digital camera |
| | BSBG05G | Automatic washing machine |
| | BSBG05H | Central heating |
| | BSBG05I | Air condition |
| | BSBG04 | How many books do you have at home apart from magazines, newspapers and school textbooks? |
| | BSBG06A | What is your mother's academic background or the one who plays her role in taking care of you? |
| | BSBG06B | What is your father's academic background or the one who plays his role in taking care of you? |
| Students' Problems (Students' Questionnaire) | BSBG13A | Exposed to Irony or verbal insult |
| | BSBG13B | My colleagues exclude me from doing activities and playing |
| | BSBG13D | My properties are stolen |
| | BSBG13E | Being hit , bullied or injured by other students |
| | BSBG13F | Students forced me to do things I don't want to do |
| Good Teaching (Math Teacher's Questionnaire) | BTBM19G | Give proper explanations for students' answers |
| | BTBM19I | Approving students' method in solving problems |
| | BTBM19J | Solving problems that have no direct clear method of solution. |
| Teaching Obstacles (Math Teacher's Questionnaire) | BTBG15D | Special needs students with physical ,mental or psychological disability |
| | BTBG15F | Careless students |
| Teacher's Problems (Math Teacher's Questionnaire) | BTBG08A | The school building needs maintenance |
| | BTBG08B | Overcrowded classrooms |
| | BTBG08D | Lack of convenient workplace (planning for lessons and cooperation with and meeting students). |
| Good Teaching (Science Teacher's Questionnaire) | BTBS19A | Watch natural phenomenon and describe what they see. |
| | BTBS19B | Watching you while you are explaining an experiment or how to make a research. |
| | BTBS19C | Preparing for or designing an experiment or a research. |
| | BTBS19D | Make experiments or researches. |
| | BTBS19E | Read textbooks or other learning resources. |
| Teaching Obstacles (Science Teacher's Questionnaire) | BTBG15D | Special needs students whether physical ,mental or psychological disability |
| | BTBG15E | Naughty students |
| | BTBG15F | Careless students |
| School Problems (Science Teacher's Questionnaire) (Principal's Questionnaire) | BCBG09AA | learning resources (textbooks) |
| | BCBG09AB | Stationary (papers and pencils) |
| | BCBG09AC | School buildings and playgrounds |
| | BCBG09AD | Heating equipment , conditioning ,and lighting |
| | BCBG09AE | Spaces for learning (classrooms) |
| | BCBG09BB | Computers for teaching math |
| | BCBG09BC | Software for teaching math |
| | BCBG09BD | Library resources for teaching math |
| | BCBG09BF | Calculators for teaching math |

| Indicators | Item Code | Item |
|------------|-----------|--|
| | BCBG09CA | Teachers majoring in science |
| | BCBG09CB | Computers for teaching science |
| | BCBG09CC | Software for teaching Science |
| | BCBG09CD | Library resources for teaching Science |
| | BCBG09CG | Equipment for Teaching Science |

Annex (5)

Measurement Categories definitions

- **Measurement of students' involvement in lessons**

Involved: The student is considered involved in math lessons if his mark on the measurement is not less than 11.4 which indicates his approval of three items at a large extent and his approval at a low degree of the other two items.

Involved: The student is considered involved in science lessons if his mark on the measurement is not less than 11.2 which indicates his approval of three items at a large degree and his approval at a low degree of the other two items.

Not involved : The student is considered not involved in math lessons if his mark on the measurement is not more than 8.3 which indicates his disapproval of three items at a low degree, and his approval at a low degree of the other two items .

Not involved : The student is considered not involved in science lessons if his mark on the measurement is not more than 8.4 which indicates his disapproval of three items at a low degree, and his approval at a low degree of the other two items.

Involved to some extent: The student is considered involved to some degree in math classes if he was not between the involved students category or the not involved students category.

Involved to some extent: The student is considered involved to some degree in science classes if he was not between the involved students category or the not involved students category.

Measurement of students' confidence in learning math

High confidence: The students 'confidence in learning math is considered high if his score at the measurement is not less than 12.0, which indicates his approval at a large degree of five items out of the nine items that form the measurement and his approval at a low degree of the remaining four items.

High confidence: The students' confidence in learning science is considered high if his score at the measurement is not less than 11.5, which indicates his approval at a large degree of five items out of the nine items that form the measurement and his approval at a low degree of the remaining four items.

No confidence: The student is considered with no confidence in learning math if his score at the measurement is not more than 9.4, which indicates his disapproval at a low degree of five items

out of the nine items that form the measurement and his approval at a low degree of the remaining four items.

No confidence: The student is considered with no confidence in learning science if his score at the measurement is not more than 9.0, which indicates his disapproval at a low degree of five items out of the nine items that form the measurement and his approval at a low degree of the remaining four items.

Moderate confidence : The student confidence is considered moderate if he is not between the students in the categories of “high confidence” or the categories of “no confidence”.

Measurement of students’ appreciation of math or science

High value: The student is considered giving high value for math if his score on the measurement is not less than 10.3 , which indicates his approval to a large degree of three items of the six items that form the measurement and his approval to a low degree of the other three items.

High value: The student is considered giving high value for science if his score mark on the measurement is not less than 10.5, which indicates his approval to a large degree of three items of the six items that form the measurement and his approval to a low degree of the other three items.

Low value: The student is considered giving low value for math if his score on the measurement is not more than 7,9, which indicates his disapproval to a low degree of three items of the six items that form the measurement and his approval to a low degree of the other three items.

Low value: The student is considered giving low value for science if his score on the measurement is not more than 8.6, which indicates his disapproval to a low degree of three items of the six items that form the measurement and his approval to a low degree of the other three items.

Average value: the student is considered giving an average value of math if he is not between the students who give high value or low value for mathematics.

Average value: the student is considered giving an average value of science if he is not between the students who give high value or low value of mathematics.

Measurement of students' love for learning math or science

The student likes learning math: The student is considered that he does not like learning math if his score on the measurement is not less than 11.3 , which indicates his approval to a large degree of five items and his approval to a low degree of the remaining two items.

The student likes learning science: The student is considered that he does not like learning science if his score on the measurement is not less than 10.8 , which indicates his approval to a large degree of five items and his approval to a low degree of the remaining two items.

The student does not like learning math: The student is considered that he likes learning math if his score on the measurement is not less than 9.0, which indicates his approval to a large degree of five items that form the measurement and his approval to a low degree of the remaining two items.

The student does not like learning science: The student is considered that he likes learning science if his score on the measurement is not less than 8.4 , which indicates his approval to a large degree of five items and his approval to a low degree of the remaining two items

The student likes learning math to some extent: The student is considered that he likes learning math to some extent if he was not between the categories of students who like learning math or do not like learning math.

The student likes learning science to some extent: The student is considered that he likes learning science to some extent if he was not between the categories of students who like learning math or do not like learning math.

Measurement of students' confidence in learning math.

High confidence: The students' confidence in learning math is considered high if his score on the measurement is not less than 12.0 , which indicates his approval of five items out of the nine items to a large degree that form the measurement and his approval to a low degree on the remaining four items.

High confidence: The students' confidence in learning science is considered high if his score on the measurement is not less than 11.5, which indicates his approval of five items out of the nine items to a large degree that form the measurement and his approval at a low degree on the remaining four items.

No confidence: The student is considered of having no confidence in learning math if his score on the measurement is no more than 9.4, which indicates his disapproval with a low degree of the five items out of the nine items that form the measurement and his approval at a low degree to the remaining four items.

No confidence: The student is considered of having no confidence in learning science if his score on the measurement is no more than 9.0, which indicates his disapproval with a low degree of the five items out of the nine items that form the measurement and his approval at a low degree to the remaining four items.

Moderate confidence: The student confidence is considered of having moderate confidence if he does not fall between the categories of students who have high confidence or who have no confidence.

Measurement of educational resources at home

Many resources: The student is considered having many resources if his score on the measurement is not less than 12.5 which indicates the student's response that he has more than 100 books at home, that he has two educational certificates at home, and that one of his parents has completed his study at university.

Few resources: The student is considered having few resources if his score on the measurement is not more than 8.2, which indicates the student's response that he has more than 25 books or less at home, that he has no educational certificates at home, and that any of his parents did not exceed the secondary stage in his studies.

Some resources: The student is considered having some resources if he is not between the categories of student who have many resources or have few resources.

Measurement of confidence in the teacher's ability to teach

Great confidence: The teacher is considered having high confidence in teaching math if his score on the measurement is not less than 9.2, which indicates that the teacher uses three teaching strategies 3 out of 5 strategies with great confidence and uses the remaining two strategies with moderate confidence.

Great confidence: The teacher is considered having high confidence in teaching science if his score on the measurement is not less than 9.3, which indicates that the teacher uses three teaching strategies 3 out of 5 strategies with great confidence and uses the remaining two strategies with moderate confidence.

Some confidence : The teacher is considered having some confidence in the teaching of math if he does not have great confidence.

Measurement of teacher's job satisfaction.

Satisfied: The math teacher or science teacher are considered satisfied with their jobs if their scores on the measurement is not less than 10.4 , which indicates the teacher approval at a large degree of three items out of the six items that form the measurement and his approval at a low degree on the remaining three items.

Not satisfied: The math teacher or science teacher are considered not satisfied with their jobs if their scores on the measurement is not more than 7.0, which indicates the teacher disapproval at a low degree of three items out of the six items that form the measurement and his approval at a low degree on the remaining three items

Satisfaction to some extent: The teacher is considered "somewhat satisfied" if he is not between the categories of teachers who have satisfaction from their job or teachers who have no satisfied with their jobs.

Measurement of the teachers' working conditions.

No problems: The math teacher or the science teacher are considered having no problems if their score on the measurement is not less than 11.7, which indicates that the teacher responded to the three areas out of the five areas that form the measure as "*not a problem*", and that it is a minor problem for the two remaining areas.

Moderate problems: The math teacher or the science teacher is considered having moderate problems if his relationship on the measurement is not more than 8.9, which indicates that the teacher responded to three areas out of the five areas that form the measure as "*moderate problem*", and as a minor problem for the two remaining areas.

Minor problems: The math teacher or a science teacher is considered having minor problems if he is not between the categories of teachers who have no problems, or the teachers who have minor problems.

Measurement of the teacher's working conditions

Safe and organized: The school is considered safe and organized if the math teacher or the science teacher score on the measurement is not less than 10.7, which indicates his approval to a large degree on three items out of the five items that make up the measurement, and his approval to a low degree of the remaining two items.

Unsafe and organized: The school is considered unsafe and organized if the math teacher or the science teacher on the measurement is not more than 6.8, which indicates his disapproval at low degree to three items out of the five items that form the measurement, and his approval at a low degree of the remaining two items.

Somehow safe and organized: The school is considered somehow safe and organized if it is not between the categories of safe and organized schools or the unsafe and organized schools.

Measurement of the school's focus on achievement from the teacher's point of view

Very high focus: The school's focus on achievement is considered very high if the teacher's score on the measurement was 13.6, which indicates the teacher's response on three areas out of the five areas that form the measurement as "*very high*" and on the remaining two areas as "*high*".

Average focus: The school's focus on achievement is considered moderate if the teacher score on the measurement is 9.5, which indicates the teacher's response on the three areas on three areas out of the five areas that form the measurement as "*moderate*" and on the two remaining areas as "*high*".

High focus: The school's focus on achievement is considered "high" if it was not between the schools of very high focus or the schools of moderate focus.

Measurement of the student's socio-economic background.

High: The school is considered with high socio - economic background if more than 25% of the students in the school belong to rich families, and no more than 25 % of the students belong to poor families.

Low: The school is considered with low socio - economic background if more than 25 % of the students in the school belong to poor families, and no more than 25 % of the students belong to rich families.

Moderate: The school is considered with moderate socio-economic background if the school is not between the schools of the high category and the schools of the category.

Measurement of the school's focus on achievement from the principal's point of view

Very high focus: The school's focus on achievement is considered very high if the principal's score on the measurement is 13.3, which indicates his response on the three areas of the five areas that form the measurement at a very high degree, and on the remaining two fields at a high degree.

Average focus: The school's focus on achievement is considered average if the principal's score on the measurement is 9.2, which indicates his response on the three areas of the five areas that form the measurement at an average degree, and on the remaining two fields at a high degree.

High focus: The school's focus on achievement is considered high if it was not between the categories of very high focus and of average focus.