

# Causes of 8<sup>th</sup> Grade Students Low Achievement in TIMSS Study-2015 from Science Teachers and Educational Supervisors

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## Abstract

The aim of the study was to examine causes of low achievement among Jordanian 8<sup>th</sup> grade students in TIMSS study-2015 from science teachers and educational supervisor. Another objective of the study was to examine the role of position (teacher, supervisor), gender, experience, educational directorate on their perceptions. To achieve this aim, a (51) items questionnaire was administrated to the science male and female teacher whose schools have reported under average level in TIMSS study- 2015; totaling (100) teachers and (114) educational supervisors. The results of the study showed that causes of lower achievement among Jordanian 8<sup>th</sup> grade students were at high levels from science teachers and educational supervisors perceptions as school administration related causes ranked first. The results found no statistically significant differences due to gender in causes for low achievement in TIMSS, while differences were found in school administration related causes due to educational directorate, in favor of middle region, due to experience, in favor of (6-10) years of experience. In light of results, the study recommended the need for organizing conferences with ministry of education officials and science teachers to discuss the how to overcome the causes behind low achievement level in TIMSS study. Finally, future research is needed to compare the results reported in high achievement countries in TIMSS study with the ones reported in Jordan.

**Keywords:** TIMSS study for science and mathematics, Students low achievement

## 1. Introduction

The purpose of Knowledge economy is the taking of the educational institutions the lead among the other societal ones, in a way that thoughts and knowledge become a core for communities. In this regard, schools are considered the starting point for these thoughts and the main source for human capital (Al – Hashimi and Al – Arazwi, 2007). This is achieved with the emphasis's, of lump with its components: aims, content, teaching methods and assessment, with the building of the learner's knowledge by themselves in order to increase their creative ability, and problem solving in the frame of instructional process which a supportive management to create new contexts and situations to support learners experiences and equip them with knowledge, values and attitudes which make them scientifically educated people (Al-Nashif, 2009), Instructional curricula represent a vital component on the top of the instructional process, through which the purposes and aspirations of society are achieved. Curriculum in the modern concept is an integrative system with its structure, components represented in its philosophy, aims, content, experiences, teaching methods, assessment measures and feedback for its improvement or development (Ali, 2010).

As each branch of knowledge has its special nature which distinguishes it from other branches, science curricula should reflect the components mature of science and its social function; otherwise, learners would come out from their instructional experience in a deformed incomplete picture about it (Attallah, 2010). The document of the broad guidelines of the science curricula of the basic education stage; issued by the council of education, contained a group of purposes, on the top of which is the acquisition of scientific facts and concepts in a functional way, in order to make the study of science a mean for understanding the environment in a way which goes with the newest innovations of science (Ministry of Education 2017) <http://www.moe.gove.jo>.

School textbook is the instrument through which purposes and aspirations are achieved through arousing the learners' interest and forming their motive toward the teaching content in a way that ensures the continuity of their positive interaction with the experiences provided within it and from without (Topcu, Erbilgin and Arkan, 2016).

As science teachers perform a basic role in the implementation of curriculum, through the development of the powers of their students thinking and the widening of their awareness and capabilities which make them a base for the development

and augmentation of their communities, besides the fact that teachers are the most informed about the problems which face students when building up concepts, knowledge and skills, the employment of competent teachers is a precondition for the improvement of the educational system (Benner and Mistry, 2007).

The process of improving and developing study curricula in the first place aims at furthering the curriculum in achieving the purposes of the educational system seeking to achieve comprehensive development. This cannot be accomplished without the assessment and evaluation of curricula. Assessment should include the four elements of curriculum, as well as the identification of the cores, without which curriculum cannot succeed, namely, the teacher, school management and the student (Ali, 2011; Saadah and Ibraheem, 2016).

The assessment process of any educational program implies the taking of decisions that directly or indirectly influence the teaching process. The decision could be the continuity of the present curriculum, or modification or elimination when it is unable to achieve what it was meant for. And as the exact decision depends on the exact information, obtaining true information forms the corner stone in the assessment process which derives its importance from the importance of the role it plays in the guidance of the educational process (Al – Fumadi and Al – Zarabee, 2004).

As a result of the concern of the educational system in Jordan about precise information and data concerning the educational situation in public and private schools, there has been a kind of co-operation with international organizations in order to develop education like the American Agency for Development, UNISCO and UNICEF. This cooperation was put in effect through the participation of Jordan in the international studies (PISA, TIMSS) whose results reflect the competency and efficiency of educational curricula through the assessment of educational quality in comparison with other participating countries (Trends in International mathematics and science study). The international study of science and mathematics is an instrument of international tests for the assessment of students achievement in science and mathematics and an evaluation of the efficiency of teaching these two subjects in the schools of participating countries at the world level. This study is conducted by the International Association for the Evaluation of Educational Achievement, It is conducted every four years for basic fourth and eighth grades. The first round was held in 1995, the second round in 1999, the third round in 2003, the fourth round in 2007, the fifth round in 2011 and the sixth round in 2015. The science test for the eighth grade consists of basic sciences for each there is a limited weight: biology with a ratio of (35%), physics with a ratio of (25%), chemistry, land science and the environment with a ratio of (20%). The required skills are factual knowledge with a ratio of (35%), conceptual with a ratio of (35%) and Reasoning and Analysis with a ratio of (30%). <https://timssandpirls.bc.edu/timss2015/frameworkshtml>. The schools participating in the test are chosen randomly. Students are given 45 minutes to answer each part of the test which includes 4 groups. As TIMSS being the largest study and worldly wide, and as it grants the participating countries the opportunity to measure performance levels and compare them internationally, Jordan has participated in five rounds of these tests.

Table (1). shows the performance means of Jordanian eighth grade students in TIMSS

Year	Students performance means	International Standard
1999	450	470
2003	475	474
2007	482	500
2011	449	500
2015	426	500

Table (1) shows a clear decline in the results of Jordanian students. These results is an indicator that should be taken into account in order to identify the reasons behind this drawback for the purpose of developing the educational process. Weak points should be determined and eliminated to enable Jordanian students to return to international competition through the provision of qualitative education.

#### Theoretical Frame and Literature:

As TIMSS are an international instrument for measuring students' level in order to judge the outputs achieved through what has been determined in the general frame of curricula and assessment, Arab and foreign studies deal with these tests from several cores. Some analyzed the content of textbooks to identify their consistency with the requirements of this study (Law – son, Bodignon and Nagy, 2002; Chi hand and Ting, 2009; Abou Sa'eedi and Al – Mazeedi, 2013), while other studies dealt with the teachers' success in these tests and students' characteristics and circumstances (Abu Aysh,

2008 and Al – Za'aneen, 2010; Al – Burhan and Theigarah, 2012). Other studies cared a out the comparison between countries whose students obtained high results in international tests (Chihand and Ting, 2009; Al- Ghamidi, 2010; Al – Burhan and Theigrah, 2012; Topcu, Erbiligin and Arkan, 2016).

Abu Aysh (2008) conducted a study with the aim of identifying the personal, scholastic and family factors of the eighth grade students participating in distinction tests, after classifying students into three categories based on their results. The study contributed 36% of the students' achievement in science to the teachers' practices and their use of teaching resources and parents' teaching.

Chihand's and Ting's study (2009) aimed at the coms parison between the content of science textbooks of the basic eighth grade in the USA and three countries: Singapore, Taiwan and Japan, whose students had the best results on the distinction test in 2007.

The result came in favor of the textbooks in the three countries which were distinguished from the American textbooks in the preparation of students for international tests.

Saed and Hammouri (2010) conducted a study with the aim of revealing the role of practices and instructional resources in the eighth grade students' achievement in Jordan on the distinction tests of 2007. The study showed a role of thase practices, with different schools, in standents' achievement Al – Ghamdi (2010) conducted a study which compared the characteristics of schools in china and Singa pore with those in Saudi Arabia "The selection of the two countries came in light of the high students results on the distinction tests in 2007, through reviewing the principals views and the eighth grade students, the study concluded a result which states that big schools which are equipped with computers besides their principals supprt of students are of the important factors which affect students learning Ambau Sa'eedi and Al – Maseedi(2013) analyzed the textbooks of several grades, including the basic eighth grade in Oman "The most prominent result of the study was that the explanation level in the textbooks in Oman was less than the ratio determined in the international study. However, the application level was higher than the international study. The study asked for searching for other factors.

Al – Burhan and Theigrah (2012) conducted a comparative study between the evaluative practices of the teachers in Saudi Arabia with those in South Kerea, and the effect of these proctices on students' results in distinction tests in bath countries. The result was in favor of the teachers in South kerea, through the use of factual evaluation and their emphasis on the questions of search and inquiry and higher skills of thinking, which had its great impact on their students results in general distinction tests in 2007.

Topcu, Erbilgin and Arkan (2016) tried to investigate the effcit of scholastic and social environment of Turkish students on their results on the international tests of distinction by comparing with Korean students obtaining advanced results in the international tests of distinction. The study found a difference in the examined factors in favor of the Turkish educational system, especially in regard to the classroom environment supporting students' learning, The study recommended the search for the role of content in the difference in students' performance.

Topcu, Erbilg and Arkan (2016) tried to investigate the effect of scholastic and social environment of Tarkish students on their results on the international tests of distiction by comparing with Korean students obtaining advanced results in the international tests of distinction. The study found a difference in the examined factors in favor of the Turkish educational system, scream environment supporting students learning, the study recommended the search for the role of content in the difference in students' performance.

Through the review of all the previous studies, it clearly appears that there is interest in the results of distinction test as being a trae indicator of students' level among their peers in different countries. This was maaifest through the search for the factors wich affect students achievement. However, the studies mostly concentrate only on one specific factor which secors to have a role in students results. All esearchere, with their different studies, recommended further investigation about other factors wich may have a role in students results. There fore, this study came as an attempt to limi the factors which may be responsible for the low level of Jordanian eighth grade students results on international tests by asking very important categories in the educational system, namely, supervisors and teachers. To the researchers knowledge, it is the first study which tried to identify the reasons behind the low level of the results of Jordanian students in the international tests of distinction in 2015, based on the comprehensive inclusion of the schools whose students obtained low results from the vies of the teachers at those schools and the supervisors of the ministry of Education in the different directorates of education.

Study problem and its Questions: the results of international tests (TIMSS) are an important indicator of the teacing process. Ministry of Education participate in them in a desire to identify the level of students performance and the extent of the achievement of the purposes and visions witnessed by the ministry as they provide an effective and objective instrument to determine where the educational system stands and in which direction in Jordan, where the students results

express the wellbeing of the Jordanian educational system in its public and private schools, taking into account that its drawback in its final round (2015) was the highest since the first participation of Jordan. This stimulated the Ministry of Education to make education a national priority which requires work in the spirit of the one group in order to develop the educational systems (Ministry of Education, 2015). As a result of what has previously mentioned, the present study came as a response to the repeated calls for revealing the reasons behind the drawback in the students' performance of the basic eighth grade in Jordan at the international tests of distinction (TIMSS), with the aim of answering the following question:

First Question: what are the reasons behind the low results of Jordanian eight grade students in international assessments (TIMSS) of science in 2015, as perceived by the supervisors and teachers of science?

The other Question: are there statistically significant differences in the reasons behind the low results of the Jordanian eighth grade students in the international assessments of science (TIMSS) in 2015, that could be attributed to job, sex, directorate of education and years of experience?

**Study significance:** The study is important because it came to fulfill the desire of the ministry of Education. Represented by its decision makers and from the supervising committees of preparing curricula and writing textbooks for the necessity of developing the teaching process, by identifying the reasons behind the drawback of Jordanian students performance in international tests (TIMSS). The study aims at identifying the reasons behind this drawback as perceived by the science teachers whose main role is the improvement of the teaching – learning process, and specifically teachers, curricula and students because they reflect the real fact of instructional situation at schools. As for teachers, they help the aspirations of the state, they reflect the real fact of the instructional situation at schools. As for teachers, they help the aspirations of the state, ministry and society to come true through their interaction with curriculum, management and students.

The importance of the study appears through the practical suggestions presented by teachers which could contribute in putting plans that promote teaching and achieve the needed improvement. The study will also provide researchers with an instrument that could be used in educational researches, and which may be the cornerstone for later research studies. Study Limitations: The study was limited to the supervisors and teachers of science at the schools whose students achievement was below general average of the students of the kingdom in the science test of the eighth grade, within the international study (TIMSS) in 2015.

### **Procedural Definition of the Study Idioms:**

**Basic Eighth Grade:** it represents the ninth year of the students study at schools, in which the student is 14 years old. They were the students of the schools whose students achievement was below the general average of the kingdom in the science test within the international study (TIMSS). International Assessments (TIMSS): it is an intentional instrument of tests for the assessment of eighth grade students in science and mathematics in the schools of the world participating countries under the supervision of the international organization for the assessment of educational achievement (IEA). This study investigates the test results which were conducted for the basic eighth grade in science in its sixth round which was held in 2015 and whose results appeared on Tuesday, 22/11/2016.

**Science supervisors:** The science teachers whose job is educational supervision at the directorates of education that the Jordanian schools belong to and whose student's achievement was below general average in the science test of the basic eighth grade within the international assessments (TIMSS) in 2015.

**Science teachers:** they are the male and female teachers who teach the eighth grade students at Jordanian schools whose students achievement was below the general average in science test within the international assessment (TIMSS) in 2015.

**Study Methodology:** the study aimed at revealing the reasons behind the low level of the achievement of the basic eighth grade in international assessments of science (TIMSS). The study used the descriptive analytical approach which cares about the current state in regard to the nature of prevalent circumstances practices and attitudes, and to help in determining, analyzing and explaining its reasons (Al-Keelani and Al-shireifeen, 2016).

**Study population:** the population of the study consisted of the supervisors of science at the directorates of education. To which belong the schools of Jordan whose students achievement in the science test of the basic eighth grade was below general average, within the international assessment (TIMSS) in 2015, and whose number was (114) in the north, middle and south directorates, from all male and female teachers of science for the basic eighth grade within the international assessment (TIMSS) in 2015, whose number was (114) male and female teachers, teaching in (111) schools, (82) were male schools, (17) female schools and (22) mixed schools. They were distributed according to the variables of Job, sex, directorate of educational and years of experience.

**Study sample:** as the study came in response to the call of the ministry of Education in Jordan in order to make education a national issue and a joint societal responsibility, the two researchers used the method of comprehensive inclusion of more accurate results. Therefore, the frequencies and ratios of the study sample were according to the variables of the study as shown in Table (2)

Table (2). Frequencies and ratios according to the variables of the study

<b>Jobe</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percentage</b>
Job	Supervisor	100	46.7
	Teacher	114	53.3
Directorate of education	North	96	44.9
	Middle	71	33.2
	South	47	22.8
Experience	1-5 years	31	14.5
	6-10 years	126	0.89
Sex	More than ten years	57	26.6
	Male	146	68.2
	Female	68	31.8
Total		214	100.0

**Study Instrument:** for achieving the aim of the study, a questionnaire was specially prepared to measure the reasons behind the low level of basic eighth grade student achievement in Jordan in the international tests (TIMSS) of science, as perceived by the teachers and supervisors of science. This was done through the following steps:

1. Giving the study question to a group of school principals, supervisors and teachers of science of basic eighth grade.
2. The reasons formed mentioned in the previous step were given in the form of points which represented the study instrument in its preliminary picture.
3. The official data of the ministry of Education about eighth grade students performance in science in the international tests was identified in order to draw the group of reasons and benefit from it in the study instrument in its preliminary form.
4. Referring to same related studies (Chihand and Ting, 2009; Al – Ghambi, 2010; Al – Ahmadi, 2011; Topcu et al, 2016).
5. For the study instrument to become (60) items divided into four domains: the first is relating to content; the second is relating to teachers; the third is relating to management and the fourth is relating to students themselves.
6. The study instrument was shown to a group of (13) judges who were university professors, specialized in Arabic language and educational sciences. The Judges recommended the linguistic reformation of some items and the omission of some items as being respected or non – relevance to the topic of the study.
7. The instrument in its final form consisted of (51) items to be answered by the study sample, Lickert's five gradation was used, where strongly agree was given five points, agree was given four points, neutral was given three points, disagree was given two points and strongly disagree was given one point.

**Validity of study instrument:** to make sure of the validity of the instrument, it was shown to a group of (13) judges specialized in Arabic language and educational sciences. The judges pointed out a group of remarks about the clarity and appropriateness of some items, recommended the linguistic reformation of some items and the omission of other items. All of their remarks were taken in the study instrument in its final form.

**Reliability of the study instrument:** to make sure of the reliability of the study, it was verified through test and retest through the application of the scale and reapplication, after two weeks, on a group of (30) outside the study sample. Then Pearson's correlation coefficient was calculated between their two estimates. Reliability coefficient was also calculated by the way of internal consistency according to Cronbach alpha. Table (3) shows the coefficient of internal consistency according to Cronbach alpha formula and the reliability of repetition of the domains and the instrument as a whole. These values were considered appropriate for the purposes of this study, as shown in Table (3)

Table (3). values were considered appropriate for the purposes of this study.

Domain	Repetition Reliability	Internal consistency
Reasons relating to students	83.0	74.0
Reasons relating to teachers	87.0	82.0
Reasons relating to management	84.0	78.0
Reasons relating to content	86.0	82.0
Reasons relating to content	86.0	82.0
Total degree	90.0	88.0

Method of correcting the study instrument: Lickert's five gradation was used for the correction of the instructs five degrees (strongly agree (5), agree (4), neutral (3), disagree (2) and strongly disagree (1)). The following scale was used for the purposes of analyzing the results:

From 1.00 – 2.33 little

From 2.34 – 3.67 medium

From 3.68 – 5.00 great

The scale was calculated through the use of the following formula:

The highest limit of the scale (5) – the lowest (1)

#### **Study Variable:**

First: independent variables: job which has two levels (Supervisor / teacher), sex with two levels (male / female), years of experience with three levels (1-5 years/ 6-10 years / more than 10 years), the direction with three levels (north / south / middle).

Second: dependent variables: they are the reasons behind the low level of Jordanian eighth grade eighth grade students results in the international assessments (TIMSS) in 2015 with four levels (Content, teachers, students and management).

#### **Study results and discussion:**

First Question: what are the reasons behind the low level of Jordanian eighth grade students results in the international assessments of science in 2015 as perceived by the teachers and supervisors of science? To answer this question, arithmetic means and standard deviations of the reasons of the low level of Jordanian basic eighth grade students results in the international assessments of science in 2015 were calculated as perceived by the teachers and supervisors of science. The following table (4) explains this.

Table (4). the arithmetic means and standard deviations of the reasons behind the low level of Jordanian eighth grade students results in the international assessment of science in 2015, as perceived by the teachers and supervisors of science.

Rank	No.	Domain	Arith mean	Standard deviation	level
1	3	Reasons relating to management	3.97	612	High
2	4	Reasons relating to content	3.81	590	High
3	1	Reasons relating to students	3.79	434	High
4	2	Reasons relating to teacher	3.72	582	High
		Total Degree	3.81	4.2	high

The results of Table (4) show that the arithmetic means range between (3.72 – 3.97). The reasons relating to management came first rank with the highest arithmetic mean (3.72) and the arithmetic mean of the instrument as a whole was (3.81). This result assures in the first degree that any progress or drawback in the students level is due to all these four factors. And if the teaching – learning process in Jordan to be developed, the weak points in each domain should be determined,

with the aim of eliminating them and creating a positive change in order to bring out a qualitative movement in basic education.

As it is shown in the results in Table (4), the participants in the study emphasized that manage meat is the most effective factor in the lower level of students results in the test (TIMSS) in 2015. For explaining this result, there will be a review of the arithmetic means and standard deviations of the items relating to the reasons of in Table (5).

Table (5). arithmetic means and started deviations of the items relating to the reasons of management

Rank	No.	Domain	Arish mean	Standard deviation	Level
1	35	Rate stimulation of sts. Excelling in TIMSS	4.12	1.030	High
2	30	Absence of cam. Between teachers and people in charge in Ministry of Education	4.1	1.028	High
3	38	Shortage of materials ofr experiments	4.07	1.036	High
4	34	Abseace of stimulation of teachers whose sts excelled in TIMSS test			
5	31	Rare training courses for pre – service			
6	36	Rare training courses for teachers in teaching methods of science	3.99	0.983	High
7	33	Non-involvement of teachers in the process of preparing curriculum	3.94	1.017	High
8	39	Teachers complaint from work pressures	3.84	1.137	High
9	32	Non – organization of periodical meetings between eighth grade teachers	3.79	1.046	High
10	37	Non – guidarce of teachers achieving the aims of curriculum	3.79	1.118	High
		Reasons relating to management	3.97	0.612	high

Table (5) shows that the arithmetic means ranged between (3.79 – 4.12). The item (35) which stated rareness of stimulation of students who excel in TIMSS came in the first rank with an arithmetic mean of (4.12), while the two items (32 and 37) which stated the non – organization of periodical meetings between eighth grade teachers, nonguidance of teach for achieving the aims of curriculam came in the last rank with an arithmetic mean of (3.79). The arithmetic meam of the reasons relating to management as a whole was (3.97).

It is noticed that one of the most prominent reasons relating to management, as perceived by the participants in the study, which led to the low level of students results in (TIMSS) test was the non – stimulation of the students who excel in this test. One of the most important factors emphasized by psychom-educational studies, is that if we want students to progress in any domein they should be positively stimulated (Levitt, 2001). This, as perceived by the two researchers, needs the support of management through the announcement of appreciation rewards for excelled studyents in TIMSS test, accompanied by an appreciation of the schools with high results and male and female teachers. There should also be special training courses for male and female teashers relating to this test, as well as periodical meetings between the eighth grade teachers in the different directorates of the kingdom and the training of pre – service part – time teachers.

Of the experiments the two researchers like to refer to as an example of the role of the efficient management in supporting students learning in general and for the preparation of students for TIMSS test in particular, is what management in the uaited arab Emirates, (<http://sycourse.com/uae/1223-timss>) did through the preparation of two study appendixes for the two textbooks of mathematics and science according to the standards of the international tests of TIMSS tests, issued from the curricula management (2013 / 2014) in the frame of the continuous development of curricula in order to satisfy the students needs of knowledge and skills to obtain the asic results to make the students in the united Arab Emirates in competition with their peers in the world who sit for this test. This study in its result is consistent with the study of al – Ghamidi (2010) and the study of Topcu, Erbilgin and Arkan (2016).

It appears from the results of Table (4) that the content domain is the reason which came second as a reason of the low

level of students results in TIMSS test.

For explaining this result, the arithmetic means and standard deviations of the items relating to the reasons of content ranked from high to low according arithmetic means, will be reviewed in Table (6).

Table (6). arithmetic means and standard deviations of the items relating to the reason of content

Rank	No.	Items	Arith mean	Stand devia	Level
1	43	Absence of scientific experiments with open ends	4.00	0.906	Hight
2	49	Little concentration on fireld deduction	3.92	0.910	hight
3	46	Non-concentration of content on students acquisition of scientific cultare	3.91	1.051	Hight
4	51	The content lacks the development of students scientific attitudes	3.89	0.967	Hight
5	47	Weak connection between scientcific concepts and stadsnts daily life.	3.88	3.041	Hight
6	45	Non-cansistence of content with students abilities	3.83	0944	Hight
7		Concentration on a big number of scientific concepts	3.83	1.144	Hight
8	481	Non-inclusion of integrated scientific processes in the content	3.79	0973	High
9	44	Non – gradation of scientific concepts	3.71	1.091	High
10	42	Lack of connection between scientific concepts and the environment	3.70	0991	High
11	40	Non-equal time allowcated for study units in each textbook	3.70	0991	High
11	40	Non – connection between content and TIMSS test	3.67	1.010	Medium
12	50	Non- equal time allocated for study units in each textbook	3.64	1.060	Medium
		Reasons relating to content	3.81	0.590	

Table (6) shows that arithmetic means ranged between (3.64 -4.00). Item (43) which states "the absence of scientific experiments with open ends" came first rank, with an arithmetic mean of (4.00), whereas item (50) which states the non – equal time allowcated for study units in each textbook came last rank, with an arithmetic mean of (3.64). the arithmetic mean of the reasons relating to content as a whole was (3.81). There fore, the absence of scientific expeiments with open ends was one of the prominent reasons of the low level of students results in TIMSS as test perceived by people participating in the study.

The two researchere think that this result came as a result of the deficiency of content to activate the real rule of scientific experiments which does not make them as a way of repenting lessons (Luft and Roehrig, 2007), but taken as a way of effective teaching methods of science in particular (Marting and Gerlouich, 2001) through the students conducting scientific experiments by using the tools, devices and materials which should be available at all schools, to be used in successive steps in order to solve scientific problems through the besic and integrated scientific processes (Simsek and kabapinar, 2010). This cannot be without making the student explore and search for the results rather then being provided with them, as the student at the present time is capable of obtaining knowledge on his own through the fild investigation connected with his deily life in light of the concentration on providing students with scientific attitudes. This is not achieved as perceived by participants when a lot of teachers at the and of the instrument of the study emphasized the importance of this point and as it is evident in the previous table, with emphasis on, lot of concepts in the Jordanian textbook of science, and this is considered as a reason behind the low level of results, due to the short academic year compared with the allocated time.

It should be noticed that the item relating to the connection between the science textbook of the eighth grade in Jordan with TIMSS test came with an arithmetic mean of (3.62). In this way, it is not one of the highly effective reasons on Jordanian students results in TIMSS test. The result could be attributed to the fact that the content of Jordanian science textbook (<http://www.moe.gov.jo>) included various topics in physics, chemistry, biology and land sciences with a very

close degree to the determined ratios in the international tests (TIMSS). This signifies the need for the involvement of students in a greater degree of its learning after having sufficient learning of information by heart and its repetition, but it should be meaningfully understood (Taha, 2010). There should be concentration on the real opportunities allocated for students learning through research and investigation, by concentrating on more experimentation. The study is consistent with the studies of (Ambou Saeedi and Al – Mazeedi, 2013; Chihand and Ting, 2009).

It appears from the results of Table (4) that the domain of students was the third reason behind the low level of students results in TIMSS test. For explaining this result there will be a review of the arithmetic means and standard deviations of the items relating to the reasons domain of students ranked from highest to last according to arithmetic means in Table (7):

Table (7). arithmetic means and standard deviations of the items relating to the students reasons

Rank	No.	Items	Arith mean	Stand deviat	Level
1	1	Students weakness in understanding abstract concepts	4.00	0808	High
2	4	Students weakness in dealing with test question	4.00	0799	High
3	7	Students face difficulty in understanding scientific concepts	3.95	0818	High
4	8	Students not caring about doing required assignments	3.95	1.013	High
5	3	Students not caring about tests as they do not affect their achievement	3.88	1.048	High
6	6	Students weakness in solving problems	3.85	0.924	High
7	10	Students weakness in concentration on the summary of important information during classes	3.80	1.006	High
8	5	The incapability of student to practice the processes of science	3.78	0926	High
9	12	Students believe the level of TIMSS questions are more than their abilityes	3.75	1.126	High
10	9	Difficulties in students peer andcrstans	3.71	0980	High
11	2	A lot of students absense during the academic year	3.65	1.045	Medium
12	13	Students acquisition of alternative scientific concepts	3.52	0968	Medium
13	11	Translation of test questions in to Arabic affected students understanding	3.49	1.112	Medium
		Students relating reasons	3.79	0434	High

Table (7) shows that the arithmetic means ranged from (3.49 – 4.00), where the two items (1 and 4) stated "students weakness in understanding abstract concepts" and "Students" weakness in dealing with test question "came first rank with an arithmetic mean of (4.00), while item (11) stated translation of test questions into Arabic affected students understanding came in the last rank with an arithmetic mean of (3.49), and the mean of the reasons relating to students as a whole was (3.79).

This points out the fact that there was objectivity in the responses of people participating in the study, as they did not blame students for the low results, and in regard to the items included in the domain of students, their ability to deal with the test questions is a very important factor if not the most important. This could be attributed to the non – training of students about the questions of the international test, and not giving them awareness of its importance and way of dealing with it. Students in eighth grade, as it has previously mentioned, are given 15 minutes for answering each one of the four groups of the test. This time should be allocated by the student for answering, not for dealing with the test. The two researchers suggest that students should be given experimental tests during the academic year, with the purpose of students familiarity of the type and manner of dealing with it, with emphasizing that students should be aware of its importance and its role in developing Jordanian education in order to cope with challenges and changes in all domains.

Concerning the weak comprehension of Jordanian eighth grade students of abstract concepts, it is a very important factor in

this study stage (Donovan and Bransford, 2005), because the student's understanding of abstract concepts in science textbooks like (atoms and their electronic distribution, electricity and magnetism) and other topics in the science textbook affect their understanding of other science components such as principles, rules and scientific theories the study is consisat with the study of (Al – Ahmadi, 2011).

There should be a concentration on the student's mestery of both concrete and abstract concepts through self – learning based on the use of mind and hands because the formation and development of scientific concepts is a continuous process in gradation of difficulty from one grade to another and from one educational stage to another (Mok and Moshing, 2005). This cannot happen without challengins students difficulties in understanding scientific concepts through the activation of the use of basic and infegated processes of science inside and outside classrooms. This cannot be through the mechanic learning be heart which is rapidly forgotten, but through the emphasis on the characteristics of scientific concepts and comparison between them and their explanation in light of previous teaching experiences.

Finally, it appeared from the results of Table (4) that the domain of teachers came as the last factor of the reasons behind the low level of students results in TIMSS test. For explaining this result, there will be a review of the arithmetic means and stardard deviations of the items relating to the teachers reasons tanked from highest to loest according to arithmetic means in Table (8).

Table (8). arithmetic means and standard deviations of the inters relating to teachers reasons ranked from highest to lowest according to arithmetic mars.

Rank	No.	Items	Arith mean	Stand deviat	Level
1	17	Teachers concentration of traditional methods in the teaching process	4.14	0942	High
2	24	Rare blending of modern technologies	4.03	0971	High
3	14	Non-variety of the use of assessment in struments and students performance eveluateion	4.00	1.016	High
4	28	Considering the textbook as the only resource in the teaching praess	3.93	1.096	High
5	16	Rare teachers benefit from the results of studies and national researches about teading methods	3.78	0957	High
6	23	Lack of flexibility when teachers deal with curriculum	3.74	1.038	High
8	29	Concentration of test questions on the level of memorization	3.73	1.198	High
9		Teachers view of themselves as the source of knowledge	3.69	1.101	High
10		Effect of teachers academic level on his students performance	3.68	1.151	High
7		Non – providing of deily feed back to students about their level	3.73	1.191	high

Table (8) shows that the arithmetic means ranged from (3.43 – 4.14) where item (17), which states "concentration of teechers on traditional methods in teaching process, came in the first rank, with an arithmetic mean of (4.14, while item (26), which statues not asking students to do assignments, came in the last rank, with an arithmetic meen of (3.43). The arithmetic mean, relating to teachers reasons as a whole, was (3.72). The result assures in spite of a lot of Arab and foreign studies which concluded the positive impact of madern methods of teaching at all different stages of education on students achievement, understanding and concepts, teachers still stick to traditional methods (North cote, 2005), despite the several conkses which emphasize the modern teacheing methods that view students as the core of the teacking process. Teachers ratura to their role dictation, asking sturdeuts to listen to the content in a way that restricts the learner's activity, efficiency and knowledge growth (Zeitoun, 2010). Teachers belifebs o teaching methods become an issue of great importance (Yahya, 2011) as they reflect in a direct way what they practise at schools. This can be of modrn technologies in teaching, with an arithmetic mean of (4.03), in a clear recognition of teachers and educational supervisors participating in the study; however in spite of the fact that modern technologies, at this age, represented in the computer with its programs, the internet with its applications and what has been derived from them like multimedia, form a rit environment for scientific investigation and the understanding of the topics of science textbook like the earth layers, movement, force, chemical changes and variety in the environments and living things, the teachers roles have not coped with the challenges and changes in the technical development which the ministry seeks to push it forward. This could be due to factors such as

crowded classrooms or the real non – competency of teachers in using modern technologies, in spite of their rehabilitating courses or because of the non – preparation of computer labs for students.

It's the traditional view about the teaching process is not restricted to the teaching methods used by teachers, it is not strange that teachers do not vary the use of assessment and evaluation instruments, and the arithmetic mean for the item which states that is (4.00). the achievement tests are the only measure which allows the student to move from one grade to another and from one stage to another. The two researchers assure that if we want assessment to be effective for its purpose, it is necessary that it should include several methods, aids and instrument (Tsai, 2002), because it is not longer accepted for the measure of students. Success to be determined by the amount of what they learn by heart, but there should be concentration of its performance competencies through teachers variation of assessment methods. The study is consistent with the studies of Saed and Hammouri, 2010; Abut Ayash, 2008; Al – Za'aneen, 2010 and Al – Burhan and Theigarah, 2012.

The other question: are there statistically significant differences that could be attributed to job, directorate, experience and Sex?

For answering this question, arithmetic means and standard deviations of the reasons behind the low level of Jordanian basic eighth grade students results in science in international assessments in science in 2015 were calculated as perceived by the teachers and supervisors of science according to the variables of job, directorate, experience and sex. For showing the statistical differences between the arithmetic means, T – test was used for the variables of job and sex and ANOVA analysis for the variables of directorate and experience. The following table clarifies this.

Arithmetic means, Table (9). standard deviations and T – test for the impact of Job on the reasons of the low level of Jordanian basic eighth grade students in the international assessments of science in 2015, as perceived by the teachers and supervisors of science:

<b>Reasons</b>	<b>Job</b>	<b>No.</b>	<b>Arith mean</b>	<b>Stand deviat</b>	<b>T Value</b>	<b>Free deg</b>	<b>Stat. sig</b>
Relating to students	Supervisors	100	3.88	0.436	2.786	212	0.006
	Teacher	114	3.72	0.418			
Relating to teachers	Super	100	3.83	0.518	2.609	212	0.001
	Teacher	114	3.62	0.571			
Relating to management	Super	100	4.07	0.694	2.237	212	0.026
	Teacher	114	3.89	0.518			
Relating to content	Super	100	3.97	0.609	3.672	212	0.000
	Teacher	114	3.68	0.540			
Total degree	Super	100	3.92	0.409	3.943	212	0.00
	Teacher	114	3.71	0.371			

Table (9) shows the existence of statistically significant differences ( $\alpha=0.05$ ) that could be attributed to the effect of job in all the domains and in the whole degree, in favor of the educational supervisor.

Second: Sex

Table (10). arithmetic mean, standard deviations and T – test of the impact of sex on the reasons of the low level of Jordanian basic eighth grade students results in the international assessments of science in 2015, as perceived by the teachers and supervisors of science.

<b>Reasons</b>	<b>Sex</b>	<b>No.</b>	<b>Arith mean</b>	<b>Stand deviat</b>	<b>T Value</b>	<b>Free deg</b>	<b>Stat. sig</b>
Relating to students	Male	146	3.79	0.450	-0.427	212	0.670
	Female	68	3.81	0.398			
Relating to teachers	Male	146	3.77	0.533	1.813	212	0.071

	Female	68	3.61	0668			
Relating to management	Male	146	3.93	0645	-1.493	212	0.137
	Female	68	4.06	0.528			
Relating to content	Male	146	3.79	0.601	-0924	212	0.357
	Female	68	3.87	0.564			
Total degree	Male	146	3.81	0.390	-0.062	212	0.951
	Female	68	3.81	0.431			

It appears from Table (10) the non – existence of statistically significant differences ( $\alpha=0.05$ ) that could be attributed to the effect of sex in all domains and in the total degree.

Third: the directorate of education:

Table (11). the arithmetic means and standard deviations of the reasons behind the low level of basic eighth grade students results in Jordan in the international assessments of science in 2015, as perceived by teachers and supervisors of science according to the variable of the directorate of education

Reasons	Categories	No.	Arith mean	Standard deviation
Relating to students	North	96	3.26	0423
	Middle	71	3.83	0463
	South	47	3.81	0498
	Total	214	3.79	0.434
Relating to teachers	North	96	3.69	0579
	Middle	71	3.82	0531
	South	47	3.63	0647
	Total	214	3.72	0582
Relating to management	North	96	3.86	0.688
	Middle	71	4.11	0.488
	South	47	3.99	0.581
	Total	214	3.97	0.612
Relating to content	North	96	3.73	0.670
	Middle	71	3.88	0.503
	South	47	3.88	0.520
	Total	214	3.81	0.590
Relating to total degree	North	96	3.75	0.409
	Middle	71	3.90	0.348
	South	47	3.80	0.448
	Total	214	3.81	0.402

Table (11) shows what seems a variance in the arithmetic means and standard deviations, as a result of the difference in the categories of the variable of directorate of education. To Explain the significance of statistical differences between the arithmetic means, ANOVA analysis was used according to Table (12).

Table (12). ANOVA analysis of the impact of directorate of education on the reasons of the low level of Jordanian basic

eighth grade students results in the international assessments of science in 2015, as perceived by the teachers

Reasons	Resource	Total degrees	Free deg.	Square means	F value	Statis s.g.
Relating to students	Between	0.229	2	0.115	0.607	
	Within groups	39.803	211	0.189		
	Total	40.032	213	0.189		
Relating to teachers	Between groups	1.280	2	0.640	1.905	
	Within groups	20.874	211	0.336		
	Total	72.154	213			
Relating to management	Between groups	2.690	2	1.345	3.679	
	Within groups	77.142	211	0.366		
	Total	79.832	213			
Relating to content	Between groups	1.201	2	0.600	1.739	
	Within groups	72.850	211	0.345		
	Total	74.051	213			
Relating to total degree	Between group	0.892	2	0.446	2.806	
	Within groups	33.552	211	0.159		
	Total	34.445	213			

Table (12) shows the non – existence of statistically significant differences ( $\alpha = 0.05$ ) that could be attributed to the directorate of education in all domains and in the instrument as a whole, except for the reasons relating to management. For revealing the statistically significant differences between the arithmetic means post comparisons were used as shown in Table (13)

Table (13). post comparisons by using method for the impact of the directorate of education on the reasons relating to management

		Arith mean	North	Middle	South
Reasons relating to management	North	3.86			
	Middle	4.11	0.26	0.12	
	South	3.99	0.14		

Table (13) shows the existence of statistically significant differences ( $\alpha=0.05$ ) between north, and middle in favor of middle.

Fourth: experience:

Table (14). the arithmetic means and standard deviations of the reasons of the low level of Jordanian sic eighth grade student results in the international assessments of science in 2015, as perceived by the teachers and supervisors of science due to the differences, in the categories of experience variable. For revealing the significance of statistical differences ANOVA analysis was used as Table (15) shows.

Table (15). ANOVA analysis of the impact of experience on the reasons of the low level of Jordan basic eighth grade students results in the international assessments of science in 2015, as perceived by the teacher and supervisor of science

Reasons relating to	Resource	Total squares	Free deg	Square means	F value	Statis.sig
Students	Between gr.	0.039	2	0.020	0.104	0.901
	Within gr.	39.993	211	0.190		
	Total	40.032	213			
Teachers	Between gr	5.163	2	2.581	8.130	0.000
	Within gr.	78.168	211	0.370		
	Total	79.832	213			
Management	Between	1.664	2	0.832	2.246	0.108
	Within gr.	78.168	211	0.370		
	Total	79.832	213			
Content	Between gr.	0.320	2	0.160	0.457	0.634
	Within gr.	73.732	211	0.349		
	Total	74.051	213			
Total degree	Between gr.	1.178	2	0.589	3.734	0.025
	Within gr.	33.267	211	0.158		
	Total	34.445	213			

Table (15) shows the non – existence of statistically significant differences ( $\alpha = 0.05$ ) that could be attributed to experience in all domains, except for the domain of the reasons relating to teacher and the total degree. And for revealing statistically significant pair differences between the arithmetic means, the post comparisons using method were used as Table (16) shows.

Table (16). post comparisons of the impact of experience on the reasons relating to teachers and total degree

		Arith. Mean	1-5 years	6-10 years
Reasons relating to teachers	1-5 years	3.74		
	6-10 years	3.83	0.08	
	More than ten years	3.46	0.28	0.36
Total degree	1-5 years	3.84		
	6-10 years	3.86	0.01	
	More than ten years	3.69	0.16	0.17

Table (16) shows the existence of statistically significant differences ( $\alpha = 0.05$ ) between (6-10) years and more than that; the differences are in favor of 6-10 years in the reasons relating to teachers and total degree. The previous results could be attributed to the fact that educational supervisor at the directorate of education from north to south passing by middle have more experience and deeper vision of the real facts of the ministry of education, in a way that is reflected on the analysis of facts by segmenting them into their elements and partial components, in order to reveal the relationships between the part and the whole and parts to determine and derive meaningful significance for the explanation of the reasons behind the low level of Jordanian students result in this international test. In regard to the non – existence of statistically significant differences that could be attributed to sex, this may explain that the impact of the four domains of the study on Jordanian students results is nearly greatly similar at male, female and mixed schools in the Ministry of Education.

Concerning the existence of statistically significant differences in the study results relating to the domain of management as a responsible factor for the low level of students results in TIMSS test at schools located in the middle, that could be attributed to the high number of the directorates of education there, whose number is (23), in comparison with (14) in the north.

The statistically significant differences relating to teachers as a reason behind the low level of students results, as perceived by participants in the study whose experiences ranged from (6-10) years, compared with those whose experience exceeded ten years, could be attributed to the fact that the participants in this category believe that teachers should adopt structural beliefs and practices that from a firm foundation for any developmental efforts in the I ministry of education as a whole and in regard to TIMSS test, in particular as these directly are reflected on students in a way thank overcomes the impact of content and school management.

### **Recommendation**

In light of the present study, and as a desire from the two researchers to contribute in the diagnosis of the reasons behind the low level of Jordanian basic eighth grade students in TIMSS test in 2015, the researchers recommend the following results:

1. Holding meetings between responsible people in the ministry of Education and the teachers whose students achievement is below the general average of the kingdom's students in TIMSS test of science for the eighth grade (this recommendation came in response to the desire of a lot of the participants in the study, who pointed out the necessity for that at the end of the instrument of the study).
2. Inspecting the technical devices at schools and preparing labs in a way that makes scientific experiments more effective.
3. Promoting teachers training programs in a way that makes them abandon their traditional practices in teaching.
4. The necessity for stimulating schools whose students excel in this test, as well as the dusting shied students in the test through an official honoring occasion, and the awareness of parents of the importance of this test.
5. Conducting studies comparing between the educational system in Jordan with countries whose achievement is high in tests.

### **References**

- Ab Ghazalah, M., & AL-Quwasmi, A. (2013). Development of the skills of learning, Thinking and Research. Amman, Var Al – Safa for publication and distribution.
- Abu Ayash, B. (2009). The factors that have to do with the variance of the achievement of second intermediate grade male and female students in mathematics and science in the kingdom of Saudi Arabia in Light of the Results of Studying International Directions of Mathematics and science (TIMSS). *Arab Gulf message*, 30(111), 207 -209.
- Al – Ghamidi, H. (2010). School characteristics in the countries with High Achievement (China – Singapore) and those of low Achievement (Saudi Arabia) in the Tests of studying the International Directions of Mathematics and science (TIMSS). An unpublished master Thesis, Faculty of Education, Umm Al – Qara University, Holy Mecca Saudi Arabia.
- Al – Hashemi, A., & Al – Arazawi, F. (2007). the Approach and Knowledge Economy in Jordan, Dar Al – Messeereh.
- Al – Nashef, S. (2004). Methods of Teaching science. Amman: Dar Al-Basheer.
- Al- Nashef, S. (2009). Scientific concepts and Teaching methods. Amman, Dar Al – Manahij for publication and distribution.
- Al- Udwan, Z., & Al – Hawamdeh, M. (2008), Instructional Design. Amman: the world of Modern Book.
- Ali, M. (2011). Modern Attitudes and Applications in Curricula and Methods of Teaching. Amman: Dar Al – Masseerah.
- Ambou S. A., & Al – Mazeedi, N. (2013). An Analysis of the Questions of Fifth and Eighth Grades science Textbooks in Oman In Light of the levels of International studies in mathematics and science (TIMSS). *The Arab Gul Message*, 34(128), 221 – 238.
- Attallah, M. (2010). Ways and Methods of Teaching science. Amman: Dar Al – Masseerah for publication and distribution.
- Benner, A. D., & Mistry, R. S. (2007). Congruence of mother and teacher educational expectations and low-income youth's academic competence. *Journal of Education And Psychology*, 99, 140–15.
- <https://doi.org/10.1037/0022-0663.99.1.140>

- Chin, J., & Ting, W. (2009). Exploration of the Learning Expection Related to(1-8) Algebra in some countries. *US China Education Review*, 1-11
- Levitt, K. (2001). An Analysis of Elementry Teachers Belifs Regarding the Teaching and Learning of science. *Science Education*, 86(1), 1-22
- Luft, J., & Roehrig, G. (2007). Capturing science teachers epistemological Belifs: The development of teacher beliefs interview. *Electronic Journal of Science Education*, 11(2), 21-40.
- Martin, R., Sexton, C., & Gerlouch, J. (2001). Teaching science for all children ( 3rd edition). Massachusetts, USA: Allyn and Bacon
- Mok, M., & Moshing, M. (2005). Multilevel Analysis of Primary Students Perception & Deployment of Self-learning Strategies. *Educational Pschology*, 25(1).
- Northcote, T. (2005). The educational beliefs of group of university teachers and their students: identification, exploration and comparison.
- Sa'adah, J., & Ibraheem, A. (2016). Current school Approach. Amman: Dar Al – Masseerah.
- Saed, S., & Hammouri, H. (2010). Does subject matter matter? Estimating the impact of instructional practices and resources on student achievement in science and mathematics. Findings From TIMSS 2007. *Evaluation& Research in Education*, 23(4), 287-299. <https://doi.org/10.1080/09500790.2010.509782>
- Simsek, P., & Kabapinar, F. (2010). The effects of inquiry-based learning on elementary students conceptual understanding of matter scientific process skills and science attitudes. *Procedia social and Behavioral science*, 2, 1190-1194.
- Topcu, M., Erbilgin, E., & Arikan, S. (2016). Factors Predicting Turkish and Korean Students science and Mathematics Achievement in TIMSS2011. *Eurasia Journal of Mathematic, Science & Technology Education*, 12(7), 1711-1737.
- Yahya, S. (2011). The Beliefs of TeachingFaculty Members and science faulty students at Yarmouk university about the Ethics of science, Learning and Teaching, unpublisb doctoral.
- Zitoon, A. (2010). International Current Attitudes in the curriculum and Teaching of science. Amman: Dar al – Shorouq for Publication and distribution.

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