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THE DEGREE OF THE SCIENCE TEACHERS PRACTICE OF CREATIVE THINKING SKILLS AT THE SCHOOLS OF JERASH GOVERNORATE

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ABSTRACT: *The study aimed at identifying the degree of the science teachers practice of creative thinking skills at the schools of Jerash governorate through their perspective by means of the questionnaire and their observations in the classroom through the note card as well as specifying the relationship between the results of the questionnaire and the note card. The study sample consisted of (210) male and female teachers; and in order to realize the research objectives, the researcher prepared a list of the creative thinking skills necessary for sience teachers and a questionnaire which included four basic domains which contained the science teachers practices related to the four fields of creative thinking in addition to a note card that incorporated the same clauses of the questionnaire. The results showed that the practice of creative thinking skills as a whole by science teachers through their perspective was average and that the degree of their practice of the same skills as a whole through class observation was low. There appeared to be a relationship between the degree of science teachers practice of the creative thinking skills from their own perspective and the degree of practicing the same skills through their observation in the classroom. In the light of the research results, a number of recommendations were produced.*

KEYWORDS: degree of practice, science teachers, creative thinking skills.

INTRODUCTION

Creative thinking attained a high standing in many countries because of its great influence in the development and progress of societies. The scientific and technological revolutions, discoveries and inventions are the harvest of creative people, in addition to its importance in the individual's development and self – realization (Jarwan, 2008).The second half of the twentieth century was distinguished by the great attention given to creativity and creative people. Many scientists like Guliford, Torrance, Getzele and Jakson cared for the development of creative thinking and creative people. Modern literature points out that the humanitarianism and distinction of the individual can be realized through elevating their intellect and ability to practice useful thinking to society. One is a real human when he / she is able to present a degree of thinking that may come to creativity. Responding to knowledge requirements in changing the educational policies and goals, gave an increasing importance to the teacher's role especially concerning giving the students creative thinking skills which are a high-class form of human activity, (Al-Srour, 2010). Of the important goals of education is teaching for thinking or learning creative skills as teaching creativity springs from the assumption that creativity is learnable. Therefore, educational research shows notable attention in the field of teaching creativity (Melvin, 1999).

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The majority of educationalists and researchers believe that creative teaching does not take place in tough circumstances or in a learning environment which does not have creative teaching (Al-khoja, 2003). Attention is given to the development of thinking skill in general and creative thinking skills in particular hoping to contribute in increasing the learner's competency and preparing a generation able to adapt with the age of information. The multiple social organizations provide integrating roles in developing the learner's creative thinking skills. However, the pioneering role is accredited to the educational institutions being responsible for supporting the society with qualified learners able to perform their expected roles perfectly.
De Bono asserted that teaching thinking falls upon education in general and on school in particular (De Bono, 2001), and schools today are in need to learning and teaching strategies more than before to help the students develop their creative skills and this happens only through providing them with suitable sources to provoke their thinking and guide them to creative performance (Katami, 2002).

Here, we must focus on the most important pillars of the educational system which is responsible for practicing creativity namely the teacher. The importance of the teacher lies in their role in recognizing the creative students which is not an easy task, thus. The more creative skills the teacher has, the more capable they become to choose the suitable teaching strategies to direct and stimulate all the potential creative powers of students (Al-Mishrifi, 2005). The current study has come to determine the ability of science teachers to meet the requirements of the present time in developing the students' creative thinking skills through practicing the procedures that develop those skills, and this presents the real picture to those in charge of the educational process about the needs of science teachers to be more effective in their teaching performance.

Previous Studies

Educational literature shows the scarcity of the researches that handled the degree of science teacher's practice of creative thinking skills, and here are some relevant previous studies.
Kashou (2001) conducted a study to identify the view of the eighth grade students about the role of science teacher in the development of their creative thinking. The study sample consisted of (441) male and female students who were chosen following the cluster random simple approach. The researcher used two tools: The first to measure the role of science teacher in the development of creative thinking and the second was the creative thinking ability test. The study results showed that the role of science teacher in developing creative thinking was average from the students point of view.

The study of Al-Shihab (2003) aimed to evaluate the role of teacher in developing creative thinking among the students of governmental schools through their own perspective and through the educational supervisors' point of view. The results pointed out that the practice of teachers to their role in developing creative thinking skills from their own perspective was high. The results also revealed the feebleness of the educational supervisors in establishing a supervisory strategy and the scarcity of the teachers' methods in dealing with creative students. Badre (2005) arranged a study to identify the factual practice of the Mathematics female teachers to the educational activities that contribute in the development of creative thinking among the intermediate and secondary stage female students in Mecca. To realize the objectives, the researcher designed a note card which included some educational activities that contribute in the development of the creative thinking of the students. The study results indicated that the reality of teaching does not include the educational activities that contribute in the development of creative thinking. The results also revealed a difference due to the academic degree in favor of

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the teachers who had a Master degree against those who had a bachelor's degree in practicing the educational activities that contribute in developing creative thinking.

In a study by Zeidan and Al-Audeh (2008), they aimed at identifying the use of science teachers in the lower basic stage in Al-khalil governorate to the creative thinking patterns in teaching. The study population consisted of all the male and female science teachers who counted (1010) teachers. The researchers developed a note card which consisted of (46) clauses, and the results showed that the degree of using creative thinking styles by the teachers was high. Hamadneh (2009) conducted a study to detect the degree of using creative thinking skills by the Science and Mathematics teachers in the higher basic stage through the perspective of the educational supervisors in Irbid governorate. The results pointed out that the degree of practicing creative thinking skills was medium.

We notice that some of the previous studies depended on the questionnaire to determine the teachers' practice of creative thinking skills while other studies adopted the note card for the same purpose. All the studies regarded the teachers as a sample of the study except for the study of kashou (2001) which took the students as a study sample. The current study resembled the previous ones in the target of specifying the degree of science teachers' practice of creative thinking skills, and they also were similar in using a questionnaire. However, this study differed from all the previous studies in that it presented a list of creative thinking skills which was prepared to suit the nature of the science subject.

Problem of the Study

Creative thinking skills are of the primary targets the science subject seeks to achieve because of their role in establishing a balanced personality among students to take critical decisions in their lives as they help them deal with present and future problems. The science teacher has a significant role in realizing the formerly mentioned goal through practicing the creative thinking skills while teaching.In recent years, the Jordanian Ministry of Education has given great attention to using modern teaching styles, and since the creative thinking pattern was one of those styles and through the researcher's work in the domain of science teaching, she found necessary to identify the degree to which science teachers practice creative thinking skills.

The researcher performed an exploratory study to a sample of science teachers of different stages, analyzed a number of lesson preparation memoranda of the same sample and attended some of their classes to determine the degree to which they practiced creative thinking skills in their teaching process. The researcher found the teachers disregard those skills with the presence of general weakness in their practice, which drove the researcher to conduct this study.

The Study Questions

The research answers the following question:

"What is the degree of science teachers' practice of creative thinking skills at the schools of Jerash governorate"?

From this question branch a set of the following sub – questions:

1- What is the degree of the science teachers' practice of creative thinking skills at the schools of Jerash governorate through their perspective as a whole and pursuant to the demographic variables of the study (gender, years of experience, academic qualification)?

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Objectives of the Research

The research aims to determine the degree of science teachers' practice of creative thinking skills through their perspective and pursuant to the study variables represented in (gender, years of experience, academic qualification).

Variables of the Research

The Independent variables

Gender which has two levels (males, females). Years of Experience with three levels (1-5 years, 6-10 years, 11 years and above).
Academic qualification with two levels (Bachelor's degree, post – graduate studies).

The dependent variable

The degree of practicing creative thinking skills by science teachers at the schools of Jerash governorate through their perspective.

The Importance of the Study

This research derives its importance from the significance of its topic. The development of the students' ability to creative thinking is of the important goals that science curricula is seeking to achieve. The theoretical importance of this research is manifested through the information its results are going to add to improve the level and quality of the students learning of science.

As for the applied importance of this research, it is represented in the following:

1- Presenting a list of creative thinking skills to be utilized by science teachers as well as providing a tool to assess their performance in connection to using creative thinking skill while teaching.
2- It may give chance to conduct other studies that handle other patterns like critical thinking or problem solving.
3- For the best knowledge of the researcher, this could be the only research on the local level.

Procedural Definitions

This research contains the following terms:

1- Degree of practice: The score obtained by science teachers through answering the questionnaire's clauses or through their observations in the classroom.
2- Science teachers: The teachers who studied the different fields of science and who work as science teachers in the basic and secondary schools of Jerash governorate for the academic year 2015/2016.
3- Jerash governorate schools: The cluster of basic and secondary male and female governmental schools of the education directorate of Jerash governorate.
4- Creative thinking skills: The behavioral manifestations that indicate the science teacher's ability to practice the creative thinking skills included in the suggested list and measured by the score attained in the questionnaire and the note card according to the used scale (very high, high, medium, low, very low).

LIMITS AND LIMITATIONS OF THE RESEARCH

The generalization of the research's results is partly dependent on the limitations which are restricted to: The degree of science teachers' practice of creative thinking skills is determined by the extent of their response to the questionnaires clauses in the academic year 2015/2016.

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METHOD AND PROCEDURES

The study population and sample

The study population consisted of all the science teachers at the schools of the directorate of education of Jerash governorate for the academic year (2015/2016) counting (350) male and female teachers according to the statistics of the education directorate of Jerash governorate, while the sample was (215) teachers. Excluding (5) invalid questionnaires because of the non – seriousness of the teacher's response or because of not answering all its items, the final sample reached at (210) teachers equal to (60%) of the original population.

Table (1) the distribution of the sample members according to variables

Variables	Variable levels	Frequency	Percentage
Gender	Male	121	57.6 %
	Female	89	42.4%
Teaching experience	(1-5) years	60	28.6 %
	(6-10) years	96	45.7%
	11 year and above	54	25.7%
Academic degree	Bachelor's degree	147	70%
	Postgraduate studies	63	30%
Total		210	100%

Tools of the study

The researcher prepared the following tools to achieve the purposes of the research according to the following methodology:

First tool (the creative thinking skills list needed by science teachers)

The primary list of creative thinking skills was derived from the educational literature related to the creative thinking concept and by viewing the national standards and general goals of teaching science. Through the aforementioned, the researcher produced a list of four basic domains under each of which was a set of sub – skills that jointly counted (50) sub – skills formulated in accordance to the nature of the science subject.

Validity of the first tool (list of creative thinking skills)

The validity of the preliminary list was verified by offering it to a group of arbitrators specialized in the methods and curricula of teaching science, psychology and measurement and evaluation who were (10) arbitrators to give their points of view concerning the competency of the skills stated in the list, their comprehension and the correlation of the sub – skills with their relevant main skill, in addition to the compatibility of the skills with the nature of the science subject and the accuracy of the clauses. The researcher adopted the views and recommended amendments of the arbitration committee and which were agreed by (80%) of the arbitrators and then reproduced them in their final form which consisted of (50) clauses and thus, the content validity of the tool was attained in both sides which are the face validity and content validity.

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Second tool (the questionnaire)

The tool aims at determining the degree of science teachers' practice of creative thinking skills through their own perspective. The skills contained in the first tool (list of creative thinking skills) were designed in the form of behavioral clauses incorporated in a questionnaire presented to the science teachers in Jerash governorate. The questionnaire was divided into two parts: The first contained the aim, instructions and data of the questionnaire while the second part included the clauses which were divided into four axes each of which included the practices of the science teacher concerning each of the creative thinking skills stated in the list, and it was designed pursuant to Likert Quintet scale to measure their estimation to their practice of creative thinking skills according to the following order (very high, high, medium, low, very low) which were given the following scores (5,4,3,2,1) respectively.

Validity of the tool (content validity)

The content validity in its two parts (face validity, logical validity) was verified for the study tool represented in a questionnaire which was offered to a group of arbitrators specialized in the curricula and methods of teaching science, psychology and measurement and evaluation who counted (10) arbitrators to give their opinions about the appropriation of the questionnaire's clauses to the desired target, the soundness of language coinage to its clauses and the suitability of the scale to the objective of the questionnaire. The necessary amendments were performed pursuant to the remarks which were agreed by (90%) of the arbitrators which means nine arbitrators out of ten.

The reliability of the second tool (the questionnaire):

The internal consistency was calculated using Chronbach Alpha equation (Test & retest) whereby the questionnaire was applied on an exploratory sample of (10) science teachers then it was reapplied on the same sample and the correlation coefficients were calculated between the scores of the two applications. The correlation coefficients values of the skills ranged between (0.635 and 0.892) and for the tool as a whole it was (0.901) which are acceptable and sufficient values as stated in table (3).

Table (2) The correlation coefficient values of the results of the two applications of the questionnaire

Axis	Test – retest reliability	Internal consistency
Freedom of expression	0.722	0.622
Creativity acceptance	0.796	0.706
Teaching activities and methods	0.635	0.585
Evaluation methods	0.892	0.772
Total	0.901	0.922

Designation and statistical treatment

The descriptive analytical approach was used in this research to suit its objectives in determining the degree of practicing the creative thinking skills by the science teachers of Jerash governorate through their perspective. The collected data was analyzed to produce results. As for the statistical treatment of data, the arithmetic means, standard deviations, T – test, F – test and correlation coefficients were used.

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RESULTS AND DISCUSSION

Following are the results produced by the researcher and their discussion pursuant to the relevant previous literature.

First: The results related to the first question: What is the degree of science teachers practice of the creative thinking skills in Jerash governorate schools through their perspective as a whole and through the demographic variables in the study?
To answer this question, a questionnaire was prepared containing the pre – specified skills and each degree of practice was given a score according to Likert Quintet scale in the following order (1,2,3,4,5), and in order to determine the degree of the teachers practice of creative thinking skills, the following statistical standard was used to point out the arithmetic mean of each clause of each axis and the total score as the researcher adopted the following standard referred to in Hamadneh (2009):

1- Arithmetic mean from (1.00 – 2.33) low degree of practicing creative thinking skills.
2- Arithmetic mean from (2.34 – 3.67) medium degree of practicing creative thinking skills.
3- Arithmetic mean from (3.68 – 5.00) high degree of practicing creative thinking skills.

To answer this question, T – test and one – way ANOVA were used and the arithmetic means and standard deviations were extracted for the degree of science teachers practice of the creative thinking skills in the schools of Jerash governorate through their perspective as a whole and for the demographic variables in the study (gender, experience, academic degree) while teaching the science subject. The following table clarify this.

Table No. (3) the arithmetic means and standard deviations of the science teachers practice of the creative thinking skills in the schools of Jerash governorate through their perspective as a whole

No.	Axis	Arithmetic mean	Standard deviation	Rank	Degree
1	Freedom of expression	4.020	1.22	1	High
2	Creativity acceptance	3.10	0.943	3	Medium
3	Teaching activities and methods	3.497	1.07	2	Medium
4	Evaluation methods	2.550	0.775	4	Medium
Total creative thinking		3.291	1.002		Medium

Table No. (3) Shows that the mean of the science teachers practice of creative thinking skills in Jerash governorate during teaching through their perspective was average based on the statistical standard which was previously derived where the arithmetic means of the study tool axes ranged between (2.55 – 4.02). The freedom of expression took the first rank with an arithmetic mean of (4.020) and with high degree, followed by the skills of teaching activities and methods with an arithmetic mean of (3.497) in a medium degree then the skill of creativity acceptance with a mean of (3.10) in medium degree and finally the evaluation methods with an arithmetic mean of (2.55) in a medium degree.

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These results are explained by that the practicing degree was medium because of the variance in practicing the main skills which ranged between (high and medium) and it was clear that teachers give big chance to the students to express themselves and that they practice creative thinking methods while teaching. They provide diverse domains of evaluation to fulfill the tendencies of the creative. The researcher attributed this to the teachers' belief that the diversity of teaching activities develops the individual's ability to creative thinking. These results agree with the studies of (Hamadneh, 2009) and (Kashou, 2001) and differ from the study of (Shihab, 2003).
To clarify the significance of the differences in the science teachers practice of the creative thinking skills in Jerash governorate from their perspective pursuant to the gender variable, the researcher used (T – test) as explained in table (4).

Table No. (4), (T – test) to state the significance of the differences in the science teachers practice of creative thinking skills in Jerash governorate from their perspective due to the gender variable

Skill	Gender	Number	Arithmetic mean	Standard deviation	T – value	df	Significance level	Verdict
Freedom of expression	Male	121	3.65	0.99	1.07	208	0.087	Insignificant
	Female	89	3.72	1.0				
Creativity acceptance	Male	121	2.87	1.04	1.88	208	0.099	Insignificant
	Female	89	2.63	0.95				
Teaching activities and methods	Male	121	3.02	0.86	1.57	208	0.150	Insignificant
	Female	89	2.99	0.85				
Evaluation methods	Male	121	2.44	0.97	1.17	208	0.220	Insignificant
	Female	89	2.65	1.02				
Skills as a whole	Male	121	2.995	0.958	1.42	208	0.139	Insignificant
	Female	89	2.926	0.942				

The former table shows that the significance level of the science teachers' practice of creative thinking skills through their perspective due to the variable of gender as a whole was (0.139) as it was (0.87) for the freedom of expression, (0.099) for creativity acceptance, (0.150) for teaching activities and methods and(0.220) for the skills of evaluation methods. All the previous values are over the value of (a=0.05), and thus there is no effect in the degree of science teachers practice of creative thinking skills in the schools of Jerash governorate through their perspective due to gender.

The researcher explains this result by the fact that the factors which affect the classroom practices of the teachers are similar to some extent as they have the same environment and they are all subject to the same preparation and qualification programs. therefore, their practices were equal. This result agrees with the study of (Al-Ajami, 1994) and partly differs from the study of (Badre, 2005).

In order to show the significance of the differences in the degree of science teachers practice of creative thinking skills in Jerash governorate through their perspective due to the variable of experience, the researcher used one – way ANOVA as stated in table (5).

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Table No. (5), (ANOVA) test to reveal the significance of differences in the degree of science teachers practice of creative thinking skills in Jerash governorate schools through their perspective due to the variable of experience

Skill	Source of variance	Sum of squares	df	Mean of squares	f	Significance level	Verdict
Freedom of expression	Among groups	35.003	2	17.501	2.479	0.086	Insignificant
	Within groups	1461.493	207	7.060			
	total	1496.495	209				
Creativity acceptance	Among groups	3.855	2	1.927	0.206	0.814	Insignificant
	Within groups	1932.245	207	9.335			
	total	1936.100	209				
Teaching activities and methods	Among groups	23.244	2	11.622	1.912	0.150	Insignificant
	Within groups	1257.923	207	6.077			
	total	1281.167	209				
Evaluation methods	Among groups	0.488	2	0.244	0.047	0.954	Insignificant
	Within groups	1067.493	207	5.157			
	total	1067.981	209				
Skills as a whole	Among groups	80.903	2	40.451	1.027	0.360	Insignificant
	Within groups	8154.621	207	39.394			
	total	8235.5	209				

The former table shows that the significance level of the science teachers' practice of creative thinking skills through their perspective due to the variable of experience as a whole was (0.360) as it was (0.086) for the freedom of expression, (0.814) for creativity acceptance, (0.150) for teaching activities and methods and(0.954) for the skills of evaluation methods. All the previous values are over the value of (a=0.05), and thus there is no effect in the degree of science teachers practice of creative thinking skills in the schools of Jerash governorate through their perspective due to experience.

This result can be explained in that the years of experience do not give true results about the professional development of the teacher as the teachers are exposed to the same work circumstances. The requirements from the inexperienced teacher are required from the long experienced one in equal terms. These results agree with the study of (Al-Ajami, 1994) and differ from the study of (wright, 1988).

To indicate the significance of the differences in the science teachers practice of creative thinking skills in the schools of Jerash governorate through their perspective due to the variable of academic degree, the researcher used T – test as stated in table (6).

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Table No. (6). (T – test) to show the significance of the differences in the science teachers practice of creative thinking skills in the schools of Jerash governorate through their perspective due to the variable of experience

Skill	Academic degree	Arithmetic mean	Standard deviation	T – value	df	Significance level	Verdict
Freedom of expression	Bachelor	3.31	0.87	2.52	208	0.000	Insignificant
	Postgraduate studies	4.38	1.15				
Creativity acceptance	Bachelor	3.01	0.79	3.33	208	0.001	Insignificant
	Postgraduate studies	3.96	1.04				
Teaching activities and methods	Bachelor	3.68	0.97	3.02	208	0.003	Insignificant
	Postgraduate studies	4.65	1.22				
Evaluation methods	Bachelor	3.1	0.81	2.62	208	0.000	Insignificant
	Postgraduate studies	4.22	1.11				
Skills as a whole	Bachelor	3.275	0.86	2.87	208	0.002	Insignificant
	Postgraduate studies	4.30	1.13				

The table shows that the significance level of the science teachers' practice of creative thinking through their perspective due to the academic degree as a whole was (0.002), for freedom of expression (0.000), for the skill of creativity acceptance (0.001), for the teaching activities and methods (0.003) and for evaluation methods (0.000). All the previous values are less than the value of (a=0.05), and consequently there is an obvious effect in the degree of science teachers practice of creative thinking skills in the schools of Jerash governorate through their perspective due to the variable of academic degree, and those differences were in favor of the post graduate studies as indicated by the arithmetic means values.

This result can be explained in that the teachers who completed their higher studies followed different majors like psychology, measurement and evaluation and curricula and teaching which provided them with good practice to the creative thinking skills inside the classroom, and this can be attributed to the attempt of those teachers to develop themselves and catch up with the rearrangements related to modern teaching strategies and the development of the creative thinking among students which made them more capable to practice and apply the strategies that develop creative thinking among students. These results agree with the studies of (Al-Ajman, 1994) and (Badre, 2005).

Summary

The Jordanian Ministry of Education is developing and establishing science curricula according to the national standards that focus on developing thinking skills among teachers, especially creative thinking. A science teacher would not be able to achieve the expected goals from the developed curricula unless trained and their classroom practices were improved which would realize the goals of science teaching.

RECOMMENDATIONS

In the light of the research results, the researcher recommends the following:

1- Holding well developed training courses for science teachers in service to train them employ creative thinking skills in teaching, and how to develop those skills among students.

2- Encouraging science teachers to use creative thinking skills in teaching and evaluation.

3- To focus, while evaluating the science teacher's performance, on the most objective evaluation tools (reconsidering the traditional tools), especially the classroom note card, to

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include items that measure the teacher's contribution in the development of creative thinking skills among their students.

4- Conducting similar studies to reveal the actual practice of creative thinking skills on the level of university or special teaching.

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