

The Degree of Applying Ishikawa (fish bone) Strategy and Creative Thinking by the Principals of Tafila City Schools in Solving the Problems of School

Dr. Mohammad Salem Al-Amarat¹

Abstract

This study aimed at identifying the degree of applying Ishikawa (fish bone) strategy and Creative Thinking by the principals of Tafila City Schools in solving the problems of School from male and female teachers' perspectives. The researcher used the descriptive analytical approach, and the questionnaire was used to collect data from the study sample that consisted of (325) male and female teachers. The results showed that the application degree was medium with a medium of (3.16). The results revealed that there are no statistically significant differences at ($\alpha \leq 0.05$) regarding the response degree of the study sample individuals according to the variables of educational level and training courses, while there are statistically significant differences due to the variable of years of experience in favor of (10-15) years and for the variable of gender in favor of males. In the light of the results, the study recommends with a number of recommendations.

Keywords: Ishikawa strategy, fish bone, creative thinking, school problems, school principals, Tafila directorate.

Introduction

The managerial process is based on the direct communication with employees; i.e. face to face. Therefore, the managerial process must encounter some problems that are supposed to be avoided and solved in an objective and rational way by the leader after verifying their original causes and consequences. Problems are factors that motivate creativity and development as well as the institution or the individual's ability to face the difficult situations bravely, in that all the problematic situations should be utilized in building the individual's personality as well as the institution which he/ she works in. The individual or the institution that learns from its mistakes will have the ability to correct its mistakes as quickly as possible (Abu Al-Khair, 2013).

In this context, the role of the school manager emerges as the first principal at school, the resident supervisor and the director of the educational process inside the school. The manager is the one who can communicate directly and constantly with teachers, and thus has the ability to recognize their needs and solve their problems (Shahri, 2014). Currently, the school manager is supposed to do more effort in order to follow creative paths in his managerial style by planning and setting the objectives, or determining the suitable procedures for implementation and follow-up; this can be done by participation, discussion as well as constant meeting inside and outside the school in order to achieve the objectives of the educational institution that he/ she is managing. The successful manager delegates authorities to other employees at school, so that they involve in shouldering responsibility, doing tasks and supervising, and thus there would be more commitment in implementing these objectives (Balwani, 2008).

School principals face several problems with various reasons for these problems. The consequences of these problems could be delineated if managers realized their adverse impact on schools, identified their reasons and used their best skills in dealing with the problem in the right way via the appropriate planning with the participation of the senior manager (Al-Arabeed, 2010).

¹ Jordan/ Tafila Technical University / Faculty of Educational Sciences / Department of Educational Psychology.
E-mail: Amarat.baha@yahoo.com

The reasons relating to problems could be attributed to not selecting the educationally and scientifically qualified school managers, lack of coping with the new development in the field of school management, the absence of competition between school principals to reflect a bright image of their schools as well as the lack of sufficient resources under school managers' control (Masad, 2005). The reasons could also be attributed to the low level of performance among some teachers due to vocational and psychological factors, various behaviors, the general low level of students in the different stages, the educational legislations that restrict the ratios of success and failure, the school discipline, the social pressures practiced by the individual of the local community , as well as some administrators' tendency to centralization and avoiding the delegation process (Allahwani, 2007).

AL-Arabeed (2010) suggested that there is a lack in using technology in education, ambiguity in the methods of evaluation as well as lack of specialty and fairness in distributing the teaching subjects. The school problems vary among schools due to internal and external factors. Therefore, the school management is expected to shoulder responsibility, face the problems, and identify their reasons, avoiding them and attempting to overcome them as well as overseeing problems before they occur. This can't be achieved via the traditional methods of dealing with school problems; thereby, school principals should think of creative methods for dealing with school problems and avoiding them (ALNassar, 2017).

Arabeed (2010) suggests that while dealing with problems, school principals should have a sense of responsibility towards problem solving because the absence of such a sense of responsibility will distract the manager and create a state of mess at school. Therefore, taking the direction of responsibility towards solving problems entails following a regular path that would eventually lead to the desired solution. In order to be able to face school problems, school principals should use new and developed methods which would, in turn, contribute to solving the educational problems suffered by schools. These methods include:

- Cause and effect or (Fish Bone)

This method has several names, such as Ishikawa Diagram in reference to the Japanese scientist Ishikawa, who is considered as the real father for quality circles or the analysis of reason and effect, or Cause and Effect Diagram. The strategy of Fish Bone was called so due to the final shape of the diagram which is like the bone of the fish after removing its meat, where the fish's head represents the main problem and each single bone in the backbones represents the main elements for this problem (Ali, 2017). The tool of fish bone is seen as an important tool for analyzing the problem with the participation of those responsible for this problem or those responsible for the main elements that could be a reason for this problem, whether it was a scientific one or at the level of scientific calculation problems (Homoud, 2013).

This contributes the planning process with regard to analyzing and finding out solutions for all the problems, regardless their size. Implementing the method of fish bone contributes to facilitating the identification of complex problems and converting them into small ones that can be solved. This method also aims at focusing attention on the positive impact and exaggerating it (Abu Al-Qombuz, 2010).

The steps of fish bone strategy are represented by identifying the targeted problem accurately and clearly, drawing a rectangle in the right side where the main problem is documented. Then, a number of rectangles are drawn on the left side representing the main causes of the problem and drawing arrows for those main causes as well as sub-arrows indicating the sub-causes related to each main cause as shown in figure (1) ((Dibsi, 2012).

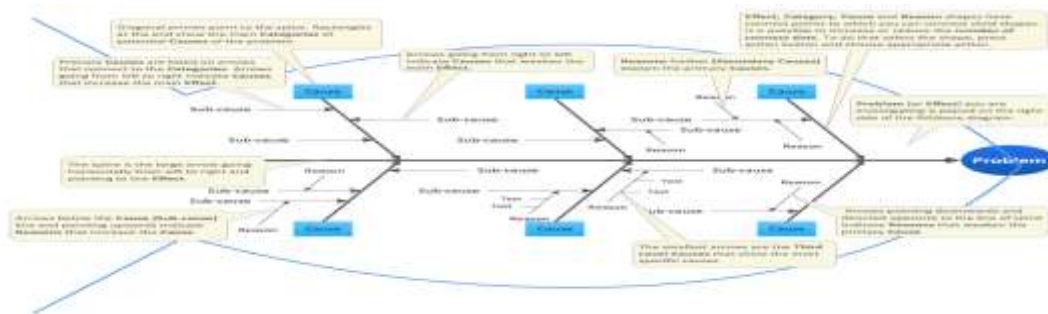


Figure (1) Ishikawa Diagram

It is evident that fish bone strategy, cause-effect, can be implemented to solve each problem, where the problem is divided into specific parts based on its nature. Then, the cause and effect relationships are identified for each part of the problem and a horizontal line is drawn from the fish mouth and linked with the fish bones (the parts

of the problem). After that, the main factors leading to the effect are written at the end of the main parts of the problem; these parts could be financial, human or organizational. Then, at each bone, the factors leading to the problem are determined. Finally, the core influential factors are restricted and additional data are collected in order to ensure the existence of cause-effect relationships (Ali, 2017).

The fish bone strategy, which is derived from the constructive theory, focus on the way of constructing and processing data as well as the way of participants' interaction at the time of solving the problem. The individual builds his knowledge based on his experience, without receiving it negatively from others (Zattoo and Kamal, 1992). The fish bone strategy is characterized by many characteristics, including: helping participants to pursue understanding and assessing the problem, providing an opportunity for extending the range of scientific ideas, making advantage of the others' experiences as well as the possibility of using it in analyzing any problem, adopting this strategy also reduces the possibility of making mistakes (Hmoud, 2013).

Scarvad, et al. (2004) says that the fishbone diagram can be enlarged into a cause and-effect diagram. This extension of fishbone diagram can be done through a questioning technique "How come it's up to five whys?" (Pande&Holpp, 2001). Thus, by identifying the causes of the effect, it is hoped that the result of the production process can be improved by changing the controlled factor of a process. This diagram is also useful to identification of causes of a potential problem. A cause-and-effect diagram focuses on emphasizing a problem or a symptom of a problem. This diagram can also show the causes of a problem by connecting them into one group.

Fish bone diagram is used for identifying the different core causes that could be attributed to a certain problem, documenting them systematically; therefore, these diagrams contribute to determine the specified causes that mostly affect the application of the fish bone strategy. The primary application of these diagrams contributes to eliminating distraction and focusing on the main cause accurately as well as verifying the sub-causes and their impact on quality characteristics (Prasad, 2012). Applying the fish bone strategy allows for more opportunities for learning through the group interaction, making advantage of the experiences of the other participants, focusing on the main problem, getting away from distraction as well as taking certain steps for collecting detailed data to analyze any problem and extending the range of the scientific ideas (Dibsi, 2012).

Based on the above mentioned, the researcher suggests that fish bone strategy, cause-effect is an easily method based on fragmenting the problem into smaller parts, and then analyzing each part in order to demonstrate the causes underlying it by drawing a shape resembling the fish bones, where the fish head represents the main problem and each sub-bone of the backbones indicate the main causes for this problem from which sub-causes of the problem are derived.

- Creative Thinking

Creative thinking isn't a difficult mission to achieve or practice and it isn't exclusive for certain people with certain characteristics or a specified group of people. Indeed, it can be practiced by anyone, but varies among people based on the experiences, skills and personal data of that individual, which help him/ her to deal with problems and find out creative solutions for them (Ahmad, 2010). The process of creative thinking is considered as a specific way for solving problems since the outcome of this process is creative in case it is new and has a value for the thinker himself or the environment where he lives. Creative thinking requires a high level of motivation and persistence in an unconventional manner; i.e. it requires modifying or refusing the pre-accepted ideas. Moreover, the outcome of the thinking process is supposed to real and generalizable (Al- Nassar, 2017).

Creative thinking is defined as " a process that helps the individual to be more sensitive to problems, shortcomings, changes in the domain of knowledge and information, disharmony, restricting difficulty points, looking for prediction solutions as well as citing and testing hypotheses or modifying them in order to get to new outcomes that the individual can transmit to others (Maliki, 2016). The strategy of solving problems creatively employs the scientific method of thinking, where it stimulate the learners' motivation and gives them the feeling of anxiety relating to the existence of a problem that can't be solved easily via the traditional methods of problem-solving, provided that the problem is appropriate for the students' level, related to their life and previous experiences and strongly related to the lesson topic (Goldman,2011, (Dawson;Venville,2010).

Osborn model is considered as one of the most popular models that introduced new methods for (Creative Problem Solving) (CPS), where this model organizes the procedures of solving complex problems by evaluating the status, clarifying the problem, generating ideas and setting a work plan.

This model can be applied individually or in groups. In case it is used in groups, it contributes to generating the best ideas by individuals (Chant, Moes & Ross, 2009). The creative solution of problems can be used to develop a general vision characterized by resilience via living real experiences in which the participant take part; therefore, he would have the chance to develop his awareness based on his creative potentials and develop his skills in order to use them in order to use them in problem-solving. The creative solution of problems is also effective in developing creative thinking and promoting the skills of scientific and creative thinking (Al-Noaimiya, Abu Alwan, Al-Abid, 2018).

The studies relating to creative thinking restricted five factors that form independent abilities for creative thinking and seen as characteristics for the creative person (Shoqairat, 2004). As suggested by (Ramini&Karassneh, 2007), the most popular tests for creative thinking was implemented by Torrance& Gilford, and showed that the most important creative thinking skills are:

- **The skill of fluency:** it means the individual's ability to produce as many ideas as possible in a certain period of time for a certain problem; it includes the verbal fluency, the intellectual fluency, and the fluency related to shapes and drawings.
- **The resilience skill:** it refers to the ability to create different unexpected ideas. It is opposite to mental rigidity which implies specific unchangeable mental patterns according to the situation.
- **The skill of authenticity:** it refers to the individual's ability to come up with unique and authentic ideas; i.e. thinking beyond the usual and it also represents the ability to set the low repeated responses; it is socially accepted.
- **The skill of sensitivity to problems:** it means the awareness and sensitivity to the problem, knowing its requirements and conditions, analyzing its elements, discovering its factors, introducing new improvement as well as realizing the relationship between things in the individual's surrounding and employing them in an awareness manner.

Creative thinking passes through a number of stages until it achieves the targeted objective, including (Al-Hariri, 2007):

- **The preparation stage:** in this stage, information is gathered about the problem.
- **The nurturing stage:** in this stage, the individual intends to think unconsciously, giving the opportunity for the solutions to come to the surface.
- **The inspiration stage:** in this stage, the basic idea for the solving the problem is generated unexpectedly, and that stimulates the feeling of fun and amazement.
- **Evaluation stage:** in this stage, solutions are investigated in order to verify their validity; some modifications may be performed.

Al- Nassar (2017) and Al-Khalidi (2013) suggested that the creative solution for problems consists of five main steps, as follows:

- **Mess-Finding:** that is performed via Sensitivity Towards Problems, awareness of the conditions, the accurate notice of things as well as promoting the process of thinking in order to identify the characteristics of the situation, determining the problems and arranging the mess based on its urgency.
- **Data-Finding:** this step aims at increasing the awareness of the mess through collecting and organizing the information, knowledge, facts, feelings, ideas, opinions and questions about the mess identified in the previous step in order to analyze the situation, clarify it and cite the problem in a manner that leads to thinking of many new ideas to stimulate the desire for solving it.
- **Idea-Finding:** this step consists of as many as possible of the ideas and alternatives for the question or the problem. As the number of the produced ideas increases, there will be more probability that some of them will represent promising solutions for the problem. However, that is only achieved by excluding criticism for any idea till we continue generating ideas and delay saying judgments. Here, we should pay attention to the importance of brain storming, creative and critical thinking in generating as many as possible of unusual ideas and solutions.
- **Solution-Finding:** this comes by determining several possible criteria for evaluating ideas and analyzing them in a regular manner. This step is utilized in providing the best probabilities for choosing the solution. The higher thinking skills, particularly arrangement and evaluation as well as critical thinking skills are used as criteria employed in judging the pre-generated ideas, which means developing criteria for evaluating ideas, considering

ideas in reality, selecting the most successful opportunities, the existence of data that support choosing the idea as well as the decisiveness in making decisions.

- **Acceptance-Finding:** in this step, there will be more focus on the elements affecting the development of the successful usage of the suggested solutions while taking in consideration several aspects that would promote or impede the efforts of accepting the solution. This step aims at converting ideas into deeds, giving the opportunity to predict the possible events at the problem time (prediction and organization), urging students to understand the details accompanying the plan implementation and developing their awareness about the possibility of facing difficulties and obstacles.

Several studies have been conducted in relation to the strategies used for solving school problems. For example, (Slameto, 2016) conducted a study which aimed at developing a program for improving the school quality using the analysis of fish skeleton. The researcher used the descriptive analytical approach as well as observation, interviewing, document analysis as well as the questionnaire in order to collect data. The researcher built a model for problem-solving by employing the strategy of fish bone consisting of eight steps.

Al- Nassar (2016) conducted a study which aimed at identifying the reality of school managers' practice for the creative methods in solving school problems in Onaiza governorate. The researcher used the descriptive approach as well as the questionnaire for collecting data from the study sample that consisted of (76) managers. The results showed that the school managers' practice for the creative methods in solving school problems was high. The results also revealed that there are no statistically significant differences due to the variable of experience, while there are statistically significant differences due to the variable of training courses in favor of six years or more.

Bayeh and Bayeh (2013) conducted a study which aimed at identifying the impact of using Fish Bone strategy on developing the skill of problem-solving among the female students at Al-Ta'if University. The researchers used the experimental approach. The study sample consisted of (70) female students from Al-Ta'if university enrolling in the course of Islamic Culture, who were divided into the control and the experimental groups. The researchers employed the students' skills in solving family problems. The results showed that there are differences between the mean scores for the two groups regarding the ability of solving problems attributed to using Fish Bone strategy in favor of the experimental group.

Faris (2012) conducted a study which aimed at identifying the degree of applying some managerial creativity methods in managing crisis in Gaza governorates from the perspectives of teachers and educational supervisors and the used methods were (morphological analysis, brain storming and Ishikawa (fish bone). The researcher used the analytical descriptive approach as well as the questionnaire for collecting data from the study sample that consisted of (114) supervisors and (600) teachers. The results showed that school managers' application to the three methods was of a medium degree, and that there are no statistically significant differences due to the variables of gender, years of experience and educational qualification.

Al- Qahtani (2006) conducted a study which aimed at identifying the impact of using the creative method of solving problems on developing the skill of decision making among the basic school principals in Al-Kharj governorate. The researchers used the experimental approach and designed a test to be applied before and after the experiment to the control and the experimental groups. The study sample consisted of all the basic school principals in Al-Kharj governorate. The results revealed that there are differences between the mean scores for the two groups in favor of the experimental group.

Badarneh and Abu Ashour (2016) conducted a study which aimed at identifying the role of school management in solving students' problems in the Bedouin schools inside the green line in Palestine. The study sample consisted of (300) employees working in the Bedouin schools inside the green line in Palestine. The researcher used the descriptive approach as well as the questionnaire for collecting data. The results showed that the school management in the Bedouin schools inside the green line has a medium-degree role in solving the students' problems. The results revealed that there are no statistically significant differences due to the variables of gender, years of experience and educational qualification.

Asiri (2000) conducted a study which aimed at identifying the degree at which managerial creativity characteristics exist in solving problems among male and female secondary school principals in Al-Ta'if from the perspective of male and female teachers. The researcher used the analytical descriptive approach and developed a questionnaire for collecting data. The study population consisted of all male and female teachers in the schools of Al-Ta'if governorate from which a sample of (614) male and female teachers was selected.

The results showed that the degree at which managerial creativity characteristics exist in solving problems among male and female secondary school principals was medium and that the most common characteristics are enthusiasm, self-confidence and taking risk. The results revealed that there are differences due to the variable of gender in favor of female managers. After reviewing the previous studies, it is evident that the current study agreed with several other studies, such as Al-Nassar (2016), Faris (2012) and Asiri (2006) in terms of using the analytical descriptive approach, while it different with Al-Qahtani (2006) and Bayeh and Bayeh (2013) which used design of the semi group pilot pretest approach. also matched with al-Nassar (2016) and Asiri (2006) in terms of using the questionnaire as the study instrument.

This study made advantage from the other studies in determining the study problem and questions, constructing the study tool (questionnaire) and determining the study approach as well as using the statistical processing and the scientific comparison of the results.

•The study statement and questions:

Schools suffer from many problems that prevent them from achieving the targeted educational objectives and affect the quality of education provided in them, which demands clarity in vision and policies that govern the educational process as well as clarity in the desired objectives from educational institution. These problems result in a decline in the educational process and are reflected negatively on the academic attainment of the students (Al- Taweel and Al-Manaseer, 2011). By reviewing the relevant literature, the researcher noticed that there are studies addressing the school managers' application for the strategies of Fish Bone and creative thinking in solving the school problems, especially with the existence of too many school problems in the educational field relating to coping with the technological changes as well as the development of knowledge economy.

The study problem is determined by its aim related to detecting the degree of applying Ishikawa (fish bone) strategy and Creative Thinking by the principals of TafilaCity Schools in solving the problems of School by answering the following questions:

- 1-What is the degree of applying Ishikawa (fish bone) strategy and Creative Thinking by the principals of TafilaCity Schools in solving the problems of School from male and female teachers' perspectives?
- 2-Are there statistically significant differences at ($\alpha \leq 0.05$) between the mean responses of the study sample individuals regarding the degree of applying Ishikawa (fish bone) strategy and Creative Thinking by the principals of TafilaCity Schools in solving the problems of School according to the variables of (educational stage, years of experience, training courses, gender)?

The study objective:

Detecting the degree of applying Ishikawa (fish bone) strategy and creative thinking by the principals of Tafilacity schools in solving the problems of School from male and female teachers' perspectives.

The study importance:

The results of this study are expected to:

- Help decision makers in the ministry of education in raising school principals' efficacy in solving the school problem in a scientific way.
- As far as the researcher knows, it is one of few studies that addressed the degree of applying Ishikawa (fish bone) strategy and Creative Thinking by the principals of TafilaCity Schools in solving the problems of School.
- This study could attract school managers' attention to the importance of coming up with creative solutions for the problems that encounter them as well as getting away from the traditional methods in solving school problems.

The study limits:

The objective limits:the degree of applying Ishikawa (fish bone) strategy and Creative Thinking by the principals of TafilaCity Schools in solving the problems of School.

- The human limits: male and female teachers in the schools of Tafilacity school.
- The temporal limits: the second semester in the academic year 218/2019.
- The spatial limits: the schools of Tafilacity school.

The study terminology:

Fish Bone strategy: Jaber (2003, 21) defined it as "the process of learning new methods, behaviors and knowledge which would result in changes in the individuals' tendency to do their work."

Creative thinking strategy: it is a guided and compound mental activity directed by a strong desire to search solutions and get to authentic results that weren't known previously (Jarwan, 2010, 23).

The study methodology:

The researcher used the descriptive approach with its survey image due to its compatibility to the study nature.

The study population:

The study population consisted of all the male and female teachers in the schools of TafilaDirectorate of education with a total of (2109) male and female teachers during the academic year (2018/ 2019) with (775) male teachers and (1334) female teachers according to the statistics of TafilaCity school (TafilaCity school, 2019).

The study sample:

The study sample consisted of (325) male and female teachers in the schools of TafilaCity school, who were chosen in the stratified sampling according to the variable of gender. The questionnaires were distributed and totally returned with a percentage of (100%), filled with complete data. Table (1) shows the distribution of the sample individuals based on the study variables.

Table (1) Study sample

Variables	Categories	Number	Percentage
Educational level	Basic	218	%67.1
	Secondary	107	%32.9
	Total	325	%100
Years of experience	Less than 10 years	153	%47.1
	10-15 years	114	%35.1
	Total	58	%8.17
Gender	Male	119	%36.6
	Female	206	%63.4
	Total	325	%100
Training courses	Less than 5 courses	165	%50.8
	More than 5 courses	160	%49.2
	Total	325	%100

The study instrument:

The researcher constructed the study instrument based on the study literature represented by the study theoretical framework as well as some previous studies, such as Faris (2012), Al- Nassar (2016) and Asiri (2000).

The study tool consisted of two parts:

The first part: the demographic information, which includes:(The educational Level, years of experience, gender, number of training courses).

- The second part: the questionnaire items; it consisted of (25) items, rated on 5-point Likert scale (very high, high, medium, low, very low).

Validity instrument:

The apparent validity of the tool was verified by introducing it to a number of arbitrators in the field of educational administration, measurement and evaluation as well as specialists in the field of education. Their opinions were taken into consideration and some items were modified. The final version of the questionnaire after performing validity and reliability requirements consisted of (25) items.

Reliability instrument:

The reliability was calculated by distributing the questionnaire to an exploratory sample consisting of (30) male and female teachers taken from the study population. The researcher applied the tool to the sample, then the internal consistency coefficient (Cronbach alpha) was calculated, where the reliability coefficient was (0.962), which is a high value for reliability coefficients in the survey studies which is about (0.80) (Sekaran&Bougie, 2010), and this value is acceptable for conducting the study.

The study variables:

The study addressed the following variables:

The demographic variables, which includes:

- **The educational level:** basic level, secondary level.
- **The years of experience:** less than 10 years, (10-15) years, more than 15 years.
- **Gender:** male and female
- **Training courses:** less than 5 courses, (5) courses or more.

The dependent variable: the degree of applying Ishikawa (fish bone) strategy and Creative Thinking by the principals of Tafila City Schools in solving the problems of School .

The procedures of implementing the study:

- Collecting the theoretical framework and the relevant previous studies.
- Building the study tool in its primary version.
- Applying the study tool.
- Collecting the data and inserting them in the computer in order to be analyzed using (SPSS) and answer the study questions.
- Writing the report of the current study which includes an explanation for the results as well as some recommendations.

The statistical processing:

The researcher used the statistical processing and methods in order to answer the study questions using (SPSS), these are:

- 1- Cronbach alpha for calculating the internal consistency.
- 2- The means and standard deviations.
- 3- t-tests for independent samples.
- 4- One-way analysis of variance (ANOVA)

The scoring criterion:

- 1- less than 1.80, very low.
- 1.80- 2.60 , low.
- 2.60- 3.40 , medium.
- 3.40 – 4.20 , high.
- 4.20 - 5 , very high

The study results and their discussion:

The results relating to the first question: What is the degree of applying Ishikawa (fish bone) strategy and Creative Thinking by the principals of Tafila City Schools in solving the problems of School from male and female teachers' perspectives? In order to answer this question, the researcher calculated the means and standard deviations for the domains of the study tool as illustrated in table (2).

Table (2) the means and standard deviations for the domains of the study tool arranged in a descending way according to the mean value

Number	Domain	Mean	standard deviation	Rank	Application degree
2	Creative thinking	3.37	.960	1	Medium
1	Fish Bone	3.02	.640	2	Medium
Total degree		3.19	0.75	-	Medium

The results in table (2) shows that the degree of applying Ishikawa (fish bone) strategy and Creative Thinking by the principals of Tafila City Schools in solving the problems of School from male and female teachers' perspectives was medium, with a mean of (3.19) and a standard deviation of (0.75). It is also evident that the value of the standard deviation was less than (1), indicating that here is a convergence between the responses of the study sample individuals.

This result is attributed to the lack of the responsible direction among some of school principals towards solving problems when addressing a certain problem. The absence of this direction lets the school principals in a state of mess and find themselves weak and distracted since taking the responsible direction requires a regular style that enables the manager to reach the desired solution. It is also suggested that the increasing number of visitors of students' parents or educational supervisors as well as the increasing work and developmental projects led to more loads on the school management; this made the work of school principals only exclusive for documenting achievements, publicizing statements and responding to them. The reality at schools also confirms that there is a certain group of teachers around the manager who always try to falsify facts, in addition to the lack of specialized training programs in the strategies of addressing school problems.

This results matches with the results of Badarneh and Ashour (2016), Frai (2012) and Asiri (2000) which were with a medium degree, while they contradict with (Nassar, 2016) which has a high degree. The study also addressed each of the study tool domains, as follows:

The results relating to Fish Bone strategy:

The means and standard deviations were calculated for the items of the domain as shown in table (3).

Table (3) the means and standard deviations for the domain of Fish Bone strategy arranged in a descending way according to the mean value

Item Number	Item	Mean	Standard deviation	Rank	Application degree
2	Agrees with all the team members about the selected problem by using brainstorming.	3.16	.84	1	Medium
11	Cooperates with teachers in collecting data for the actual causes of the problem	3.11	.82	2	Medium
1	Identifies the problem being analyzed and documents its details with the participation of teachers.	3.11	.77	2	Medium
13	Writes down the reached results to resolve the problem.	3.05	.85	4	Medium
9	Cooperates with teachers in classifying the potential causes of the problem in main categories.	3.05	.85	4	Medium
10	Does his efforts to cite the possible and actual causes of the problem in a measurable manner.	3.03	.91	6	Medium
3	Divides the problem into specific parts based on its nature.	3.02	.92	7	Medium
6	Determines the cause and effect relationships for each part of the problem.	3.01	.87	8	Medium
4	Employs the appropriate scientific methods and statistical methods in order to start the search for a solution to the problem	2.98	.95	9	Medium
8	Urges teachers to discover potential and actual causes of the problem	2.96	.84	10	Medium
12	Excludes the unreal causes of the problem.	2.94	.79	11	Medium
7	Avoids generalities when talking to teachers about the causes of the problem.	2.94	.92	11	Medium
5	Focuses on a specific issue and excludes the scattering ideas during research	2.91	.84	13	Medium
The total degree of the domain		3.02	0.64	-	Medium

Table (3) shows that the mean for the domain was (3.02) with a standard deviation of (0.64) and all the (13) items had a medium degree of applying the Fish Bone strategy, ranging between (2.91-3.06). It is also evident that the value of the standard deviation was less than (1), indicating that here is a convergence between the responses of the study sample individuals.

Item (2) "Agrees with all the team members about the selected problem by using brainstorming" was in the first rank with a mean of (3.16) and a standard deviation of (0.86). This is due to the fact that managers don't engage teachers in choosing the school problems that face the school, where managers depend on themselves in addressing the problems, or they only engage some close teachers in determining the problem.

Item (11) "Cooperates with teachers in collecting data for the actual causes of the problem" was in the second rank with a mean of (3.11) and a standard deviation of (0.82). This is due to the individual practices of school principals in collecting data about the problem causes. It is sometimes attributed to their focus on the problem symptoms without searching the causes and treating them.

Item (7) "Avoids generalities when talking to teachers about the causes of the problem." was in the penultimate rank with a mean of (2.94) and a standard deviation of (0.92). This indicates that school principals use generalities when talking about the problem with restricting it or restricting the participating teachers in order to avoid the occurrence of problems between teachers when talking about the shortcoming causes or due to respecting the feelings and senses of teachers.

Item (5) "Focuses on a specific issue and excludes the scattering ideas during research" was in the last rank with a mean of (2.91) and a standard deviation of (0.84). This indicates interaction in addressing more than one topic or aspect when talking about problems, leading to distracted solutions as well as plurality for the discussed issues.

-The results relating to the strategy of Creative Thinking

The means and standard deviations were calculated for the items of the domain as shown in table (4)

Table (4) the means and standard deviations for the domain of creative thinking arranged in a descending way according to the mean value

Item Number	Item	Mean	Standard deviation	Rank	Application degree
14	Developing his capabilities in finding new solutions for any problem at work.	3.61	1.25	1	High
15	Setting new plans when solving a certain problem	3.55	1.20	2	High
25	Pursuing the implementation of the solutions agreed upon with the work team.	3.52	1.30	3	High
24	Documenting the reached solutions	3.51	1.19	4	High
17	Getting away from the traditional methods in presenting the school problems to teachers.	3.45	1.17	5	High
16	Getting away from repeating the ideas of others in solving the problems facing him at work.	3.40	1.20	6	High
21	Asking questions that would enrich the topic of problem solving.	3.38	1.21	7	Medium
18	Developing his ability to see what others don't see in the targeted problem.	3.32	1.07	8	Medium
20	Identifying the elements of disorder in performance which lead to problems	3.26	1.24	9	Medium
23	Identifying the available options to solve problems.	3.26	1.23	9	Medium
22	Developing the suggested solutions and alternatives for the problem.	3.14	1.15	11	Medium
19	Predicting problems before they occur.	3.03	1.29	12	Medium
The total degree of the domain		3.37	0.96	-	Medium

Table (4) shows that the mean for the domain was (3.37) with a standard deviation of (0.96), where (6) items had a high degree of applying the creative thinking strategy, and the means ranged between (3.40-3.61), while (6) items had a medium degree of applying the creative thinking strategy, and the means ranged between (3.03 - 3.38).

It is also evident that the value of the standard deviation was less than (1), indicating that here is convergence between the responses of the study sample individuals. Item (14) "Developing his capabilities in finding new solutions for any problem at work." was in the first rank with a mean of (3.61) and a standard deviation of (1.25) and a high degree. This result could be attributed to the attempts of school principals to think creatively in order to solve some of the problems that may face them at work by pursuing the development in information in the field of managerial creativity and by recognizing the others' experiments in the field of dealing with the school problems.

Item (15) "Setting new plans when solving a certain problem" was in the second rank with a mean of (3.55) and a standard deviation of (1.20) and a high degree. This indicates that the school principals utilized from the results that they gained when they solved a certain problem at school and they planned for finding new solutions for the future problems based on the gained feedback.

Item (22) "Developing the suggested solutions and alternatives for the problem" was in the penultimate rank with a mean of (3.14) and a standard deviation of (1.15). This could be attributed to the school principal's satisfaction with one solution for the problem as well as measuring based on previous solutions in dealing with problems without developing more than one alternative for them.

Item (19) "Predicting problems before they occur" was in the last rank with a mean of (3.03) and a standard deviation of (1.19). This could be attributed to the absence of good planning which is based on investigating the internal and external environment of the school (Swat analysis) as well as not recognizing the weaknesses and risks that could cause problems for the school and using the traditional methods based on arbitrary solution or overlooking the problem and leaving it without satisfying solution.

Theresualt of second question: which state :Are there statistically significant differences at ($\alpha \leq 0.05$) between the mean responses of the study sample individuals regarding to the degree of applying Ishikawa (fish bone) strategy and Creative Thinking by the principals of TafilaCity Schools in solving the problems of School according to the variables of (educational level, years of experience, training courses, gender)?

In order to answer this question, means, standard deviations, t-test, one-way variance analysis, and Scheffe test for post comparisons were calculated as follows:

The differences based on years of experience:

The means, standard deviations were calculated in order to detect whether there are statistically significant differences between the mean responses of the study sample individuals according to the variable of experience years, as illustrated in table (5)

Table (5)the means, standard deviations for the domain of the study tool according to the years of experience

categories	Less than 10 years		10-15 years		More than 15 years		Total degree	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Fish Bone	2.93	0.77	3.19	0.49	2.94	0.65	3.02	0.64
Creative thinking	3.21	1.05	3.61	0.84	3.31	0.82	3.37	0.96
Total degree	3.06	0.82	3.39	0.63	3.12	0.69	3.19	0.75

Table (5) shows that there are apparent differences in the means according to the categories related to the variable of years of experience regarding the degree of applying Fish Bone strategy and creative thinking in solving school problems from teachers' perspective. In order to determine whether the differences between the means are statistically significant at ($\alpha \leq 0.05$), the researcher performed the one-way analysis of variance. The results were as shown in table (6).

Table (6) One-way analysis of variance for the domains of the study tool according to the years of experience

Domains	Source of variance	Total squares	DF	Mean squares	F value	Significance level
Fish Bone strategy	Between group	4.996	2	2.498	6.154	0.002
	Within group	130.693	322	.406		
	Total	135.689	324			
Creative thinking strategy	Between group	10.681	2	5.341	5.955	0.003
	Within group	288.799	322	.897		
	Total	299.480	324			
Total degree	Between group	7.415	2	3.707	6.734	0.001
	Within group	177.284	322	.551		
	Total	184.699	324			

The results of table (6) show that there are no statistically significant differences at ($\alpha \leq 0.05$) regarding the study sample individuals estimation for degree of applying Fish Bone strategy and creative thinking in solving school problems from teachers' perspective according to the years of experience on the domains of the study tool and the total degree. In order to identify the direction of the differences significance for the domains and the total degree, Scheffe test for post comparisons was used as illustrated in table (7).

Table (7) Scheffe test for post comparisons for the domains according to the years of experience

Domains	Categories	Less than 10 years	(10-15) years	More than 10 years
Fish Bone strategy	Less than 10 (2.93)	-	*0.003	-
	10- 15 (3.19)	-	-	-
	More than 15 (2.94)	-		-
Creative thinking strategy	Less than 10 (3.21)	-	*0.004	-
	10- 15 (3.61)	-	-	-
	More than 15 (3.31)	-	--	-
Total degree	Less than 10 (3.06)	-	0.002	-
	10- 15 (3.39)	-	-	-
	More than 15 (3.12)	-	-	-

The results of table (7) showed that there are statistically significant differences at (0.003) regarding Fish Bone strategy between (less than 10 years) and (10-15 years) in favor of (10-15) years, with a mean of (3.19), while the mean for (less than 10 years) was (2.94).

The results also revealed that there are statistically significant differences at (0.004) regarding creative thinking strategy between (less than 10 years) and (10-15 years) in favor of (10-15 years) with a mean of (3.61), while the mean for (less than 10 years) was (3.21).

The results also showed that there are statistically significant differences at (0.002) regarding the total degree of the domains between (less than 10 years) and (10-15 years) in favor of (10-15 years) with a mean of (3.39), while the mean for (less than 10 years) was (3.06).

This result could be attributed to the fact that those with long experience could have felt bored and less motivated while those in the category (10-15) years still have the ambition and motivation to work, especially with the incentives provided by the ministry of education, such as teachers' ranks and the distinguished teacher, in addition to the managerial ambition to take managerial positions at schools, in the educational supervisor or in the senior management positions. Indeed, this could make them more interested in recognizing the strategies of school principals in solving school problems.

This result contradicts with (Nassar, 2016), Badarneh and Ashour (2016) and Fraiss (2012) which showed that there are no statistically significant differences due to the variable of experience.

The differences due to the educational level:

In order to detect whether there are statistically significant differences between the means of the study sample individuals' responses due to the educational stage, the researcher used t-tests for the comparison between two independent means as shown in table (8)

Table (8) the results of t-test for the study sample individuals' responses to the study tool domains due to the variable of educational stage

Dimensions	Basic N (208)		Secondary N (117)		t-test	
	Mean	Standard deviation	Mean	Standard deviation	T value	Significance level
Fish Bone strategy	2.99	0.66	3.08	0.61	1.304	.1930
Creative thinking	3.37	1.03	3.36	0.81	.0720	.9430
Total degree	3.17	0.80	3.22	0.66	.5360	.5920

The results of table (8) showed that there are no statistically significant differences at ($\alpha \leq 0.05$) for all the study domains and the total degree of the domains according to the variable of educational stage. This result is attributed to the agreement between the responses of the study sample individuals, regardless the educational level in which they work, with regard to the managerial practices of the school principals in solving the school problems by observing the behaviors of the school managers, in addition to the geographical harmony of the student at schools and the similar nature of school problems as well as the similarity between school principals in terms of the suggested solutions.

This study has uniqueness in addressing this variable since the researcher didn't find any previous studies addressing this variable.

The differences due to gender:

In order to detect whether there are statistically significant differences between the means of the study sample individuals responses due to the variable of gender, the researcher used t-tests for the comparison between two independent means as shown in table (9)

Table (9) The results of t-test for the study sample individuals responses to the study tool domains due to the variable of Gender.

Dimensions	Female N(208)		Male N (117)		t-test	
	Mean	Standard deviation	Mean	Standard deviation	T value	Significance level
Fish Bone strategy	3.18	.51	2.89	.70	4.157	.0000
Creative thinking strategy	3.78	.79	3.05	.96	7.288	.0000
Total degree	3.47	.61	2.97	.78	6.285	0.000

The results of table (9) showed that there are statistically significant differences at ($\alpha \leq 0.05$) for all the study domains and the total degree of the domains according to the variable of gender in favor of males. This could be attributed to the fact that the male students' schools have more problems and that the male students' problems are more variant in comparison with females, where can see the problems of bullying, students' absence, low academic achievement, lack of teachers' motivation to work as well as their negative attitudes towards the job. On the contrary, the females' schools are less problematic since there is more commitment to work, more discipline among female students relating to social customs and traditions as well as more academic achievement among the female students.

This result matches with Asiri (2000) which indicated that there are differences in favor of females, while it contradicts with Faris (2012) which indicated that there are no differences due to gender.

The differences due to training courses:

In order to detect whether there are statistically significant differences between the means of the study sample individuals responses due to the variable of training courses, the researcher used t-tests for the comparison between two independent means as shown in table (10).

Table (10) the results of t-test for the study sample individual's responses to the study tool domains due to the variable of training courses.

Dimensions	Less than 5 courses N(165)		More than 5 courses N(160)		t-test	
	Mean	Standard deviation	Mean	Standard deviation	T. value	Significance level
Fish Bone strategy	2.99	0.67	3.05	0.62	0.736	.4630
Creative thinking	3.33	1.00	3.41	0.91	0.800	.4240
Total degree	3.15	0.78	3.22	0.72	0.817	.4150

The results of table (10) showed that there are no statistically significant differences at ($\alpha \leq 0.05$) for all the study domains and the total degree of the domains according to the variable of training courses. This could be attributed to the similarity between the responses of the study sample individuals about the school managers' application to the strategies of school problems' solving regardless the number of training courses that they received and the agreement between the sample individuals that the practices are still traditional and habitual aiming at specifying the problem or overlooking it without addressing it in a scientific way. Also, the school principals focus on theorization in their meeting with teachers in relation to problem solving without taking any practical action and that loses the value of solutions.

This result matches with Nassar (2016) which indicated that there are differences according to the variable of training courses in favor of (6) courses or more.

Recommendations:

- Preparing training programs for school principals regarding Fish Bone strategy as well as creative thinking in order to face the school problems.
- Generalizing the successful experiments in the strategies of solving school problems to the other schools in order to make use of them.
- Conducting more studies about practicing the strategies of Fish Bone strategy and creative thinking on other educational directorates.

References

- Abu Al-Khair, L., (2013). the degree at which the Heads of the Academic Departments at the Private Jordanian Universities in Amman practice the participatory leadership and its relationship with the ability to deal with problems. Amman, Jordan.
- Abu Al-Qomboz, M. (2010). Thinking Strategies (Fish bone). The Forum of the General Department of Education, Najran.
- Ahmad, D. (2010). The skills of creative thinking among high school principals in Amman and its relationship to the degree of teachers' participation in the decision-making process. (Unpublished master thesis), the Middle East University. Amman, Jordan.
- Al- Arabeed, N. (2010). The role of participatory leadership in the directorates of education in solving the problems of secondary school principals in Gaza governorates. (Unpublished master thesis), Al-Azhar University, Gaza, Palestine.
- Asiri, Y. (1420). The extent at which of administrative creativity exists in solving problems among the secondary schools managers in Al-Ta'if from the perspective of male and female teachers (unpublished master thesis), Umm al-Qura University
- Ali, M. (2017). The impact of fishbone strategy and climb the plateau in the acquisition of the historical concepts and retain the students first grade Average. Journal of Al-ostath.2 (232).225- 252.

- Al-Khalidi, J. (2013). The impact of a training program based on creative solution to problems on developing the decision-making skills among the students of the tenth grade in the subject of Islamic education in Jordan. *The Journal of the faculty of Basic Education / Babylon University*, (10), 3-19.
- Al-Hariri, R (2007). Preparing the administrative leadership of the future schools in the light of the total quality. Amman: Dar Al-Fikr
- Al-Nuoaimiya, S., Abu Alwan, R Al-Abed, A. (2018) .The effectiveness of a training program based on the creative solution to problems. *The journal of educational and psychological studies / Sultan Qabous University 12 studies training program* (3), 444 – 464.
- Al- Shahry, O (2014). The role of the school manager in solving the problems of students in public schools in Al-Riyadh. (Unpublished master thesis), the University of Imam Mohammad bin Saud.
- Al-Jadi , A. (2008). The role of the school administration in addressing the problems of secondary stage students in the governorates of Gaza and the methods of activation.(Unpublished master thesis), the Islamic University, Gaza.
- Al- Nassar, M. (2017).The degree at which the school principals practice creative methods in solving the school problems in Onaizagovernorate. *Al-FayoumUniversity, Journal for Educational and Psychological Sciences* (1), 1-44.
- Al- Shahri, O (2014). The role of the school manager in solving the problems of students in public schools in Al-Riyadh. (Unpublished master thesis), the University of Imam Mohammad bin Saud.
- Al- Ramini, F, &Karasneh, J. (2007).*Brainstorming Strategy, the Matrix of Creative Education and Problem Solving.* Al Ain: University the University Book.
- Al- Taweel, H, &Manaseer.L(2016)Developing a strategy to control the problems of education in the Jordanian private schools. *Journal of Studies, Educational Sciences*, 38 (4), 1378- 1398.
- Al- Qahtani, S. (2013). Leadership styles among school principals and their relationship to the behavior of organizational citizenship of teachers from the perspective of secondary school teachers in Jeddah Governorate (Unpublished Master Thesis), Umm Al Qura University, Makkah Al -Mukarramah
- Badarna, L&abuAshour, M.(2016) Role of School Administration in Solving Students' Problems among Bedouin Schools within the Green Line in Palestine. *Journal of Education and Practice*,7, (.6), 182- 190 .
- Bayeh, B, and Bayeh, M. (2013). The impact of using the strategy of the fish in developing the problem solving skills among the female students of Al-Ta'if University in the course of Islamic culture.*The International Specialized Educational Journal*, 3 (1), 142- 162.
- Chant,R;Moes,R;Ross,M (2009).Curriculum construction and teacher empowerment: Supporting invitational education with a creative problem solving model, *Journal*, 15(.2).55-67.
- Dawson,V&Venville,G. (2010).Teaching strategies for developing students' Argumentation skills about socio-scientific issues in high school genetics, *Research in Science Education*, 40(2),133-148.
- Debsy, H. (2012).The impact of using fish bone in the development of scientific concepts in the subject of science.*The Journal of the University of Damascus*, 28 (2).
- Faris, M. (2012).The managerial creativity in managing crisis among school principals in Gaza governorates(unpublished master thesis), Al-AzaharUniversity.Gaza.
- Goldman, S (2011).Choosing and using multiple information sources: Some new findings and emergent issues, *Learning & Instruction*, 21(2), 238-242.
- Hamoud, A .(2013). Investigating the effectiveness of the strategy of thinking loudly and the fish bone strategy in developing students' scientific reasoning and their attainment for scientific knowledge.*Teacher preparation Institute. Al- Karkh Al-Sabahi. Baghdad. Iraq. The Professor Journal*.1 (206), 451- 480.
- Jarwan, F. (2010) talent, excellence and creativity. (4thed) Amman: Dar Al-Fikr.
- Jabir, A. (2003). Multiple intelligences and understanding: development and deepening. Amman: Dar Al-Fikr
- Lahwani, H. (2007). The problems faced by the managers of United Nations Relief and Works Agency schools in the basic stage from the perspective of the managers and teachers of these schools in the northern governorates of Palestine (unpublished master thesis), Al-Najah National University, Nablus, Palestine
- Maliki, E. (2016). The Importance of Brainstorming in Developing Creative Thinking (unpublished Master Thesis), the University of Mohammed Khaydar, Biskara, Algeria
- Masad, O. (2005).*School Management.* Amman: Dar Safa for Publishing and Distribution.
- Osborn, A,(2001).*Applied Imagination, Principles& Procedures of Creative problem-solving.*Charles Scribner's Some, united states of America.
- Pande, P., &Holpp, L. (2001). *What Is Six Sigma?* (McGraw-Hill Education, Ed.).Black lick, Ohio.

- Prasad, K. et al. (2012). Application of Six Sigma Methodology in an Engineering Educational Institution. *International Journal of Emerging Sciences*, 2(2), 210–221.
- Scarvada, A., et al. (2004). A review of the Causal Mapping Practice and Research Literature. In *Second World Conference on POM and 15th Annual POM Conference*. Cancun, Mexico: POM.
- Shoqairat, M. (2004). *Creativity in educational supervision and school management*, Amman, Dar Al Forqan for Publishing and Distribution.
- Slameto, U. (2016). The application of fishbone diagram analysis to improve School Quality. *Dinamika Ilmu*, 16(1), 59-74
- Sekaran, U., & Bougie, R. (2010). *Research methods for business: A skill-building approach* (5th ed.) Haddington: John Wiley & Sons.
- Tiann. (2012). Diagram Fishbone dari Ishikawa. Retrieved from <https://tianno.wordpress.com/2019/05/12>
- Zaytoon, H., & Kamal, A. (1992). *Constructivism, an epistemological and educational perspective*. Alexandria: Knowledge facility