EFFECT OF TRIZ PROGRAM ON CREATIVE THINKING SKILLS AND DECISION-MAKING SKILLS AMONG GIFTED STUDENTS IN SAUDI ARABIA

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by

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DEDICATION

To the person that I proudly carry his name, whom I miss since my childhood, the man who dedicated his life for us, and sacrificed himself for our happiness to my late father, may God bless his soul and rest him in peace.

To my wisdom, my knowledge my path, my heaven the spring of love, optimism and hope to my support, my strength and my refuge after God To my beloved mother Salma.

To the woman who preferred me to herself the woman I depended on after God in completing this path, the wife whose means is to satisfy God, and whose aim is to build her family, to my fellow in this journey, my wife Majdah.

To those who have shown me the best of life, with whom I tasted the most beautiful moments, to my brothers and sisters.

To the greatest planets of the universe, to the beacon of love in all the days of the year, the joy of the four seasons, to my children: Saud, Joory and Fahad, God bless them all.

Saleh Aljohani

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LIST OF ABBREVIATIONS

CCEA	The Council of Curriculum, Examinations and Assessment
CoRT	Cognitive Research Trust Thinking Program
CPS	The Creative Problem Solving
DMGT	Differentiated Model of Giftedness and Talent
KSA	Kingdom of Saudi Arabia
TTCT	Torrance Test of Creative Thinking
TRIZ	Teoria Reshenigy Izobreataekikh Zadatch (Russian Language)
TIPS	Theory of Inventive Problem Solving
USM	Universiti Sains Malaysia
PRT	Pre Test
PT1	Post Test1
PT2	Post Test2 After 1.5 Month
DMSS	Decision-Making Skills Scale
ST	Student

KESAN PROGRAM TRIZ KE ATAS KEMAHIRAN BERFIKIR SECARA KREATIF DAN KEMAHIRAN MEMBUAT KEPUTUSAN DALAM KALANGAN PELAJAR PINTAR CERDAS DI ARAB SAUDI

ABSTRAK

Kajian ini bertujuan untuk mengenal pasti kesan program TRIZ ke atas kemahiran pemikiran kreatif dan membuat keputusan dalam kalangan pelajar pintar cerdas di Arab Saudi. Kajian ini juga bertujuan untuk menjawab soalan penyelidikan yang merangkumi tahap, hubungan antara kedua-dua kemahiran ini, kesan program TRIZ dan pandangan pelajar pintar cerdas mengenai kesan program TRIZ berkaitan kemahiran-kemahiran ini. Kajian ini menggunakan penyelidikan kaedah campuran. Sampel kajian terdiri daripada pelajar pintar cerdas menengah kelas pertama. Mereka diagihkan kepada dua kumpulan: kumpulan eksperimen dan kumpulan kawalan. Penyelidik menggunakan TTCT dan Tarawneh Scale (2006) untuk mengukur kemahiran membuat keputusan. Kaedah statistik adalah berkaitan dengan kekerapan, peratusan, cara, sisihan piawai skor pelajar yang berbakat dalam jumlah dan sub-skor dalam pemikiran kreatif dan skala kemahiran membuat keputusan. Koefisien korelasi Pearson dikira untuk mencari korelasi antara pemikiran kreatif dan kemahiran membuat keputusan. Analisis ANCOVA kovarians dan analisis multivariate kovarians MANCOVA digunakan untuk menilai kesignifikan perbezaan antara kumpulan eksperimen dan kawalan dalam jumlah dan sub-skor. Hasil kajian menunjukkan bahawa terdapat penurunan tahap kemahiran pemikiran kreatif di kalangan pelajar berbakat. Keputusan juga menunjukkan bahawa tahap kemahiran membuat keputusan di kalangan pelajar berbakat adalah pada tahap sederhana.

Berkenaan dengan dimensi, tahap kemahiran membuat keputusan adalah sederhana dalam empat dimensi dan rendah dalam empat dimensi lain. Hasilnya menunjukkan hubungan korelatif positif yang tinggi antara skor keseluruhan pada skala pemikiran kreatif Torrens dan skala kemahiran membuat keputusan. Hasilnya juga menunjukkan kesan program TRIZ ke atas pemikiran kreatif dan kemahiran membuat keputusan dalam kalangan pelajar pintar cerdas menengah pertama di Wilayah Jeddah, sama ada pada jumlah skor atau kemahiran sub pemikiran kreatif dan membuat keputusan dalam kalangan kumpulan eksperimen. Kajian ini mencadangkan keperluan untuk menggunakan program TRIZ dalam proses pendidikan dengan memasukkan prinsip-prinsip teori penyelesaian masalah kreatif TRIZ dalam kurikulum Kementerian Pendidikan, supaya dapat membantu pelajar berbakat mengembangkan pemikiran kreatif dan kemahiran membuat keputusan. Ia juga mencadangkan pentingnya menyediakan program pengayaan untuk pelajar pintar cerdas dalam pemikiran kreatif dan kemahiran membuat keputusan secara bebas dari kurikulum, sebagai tambahan kepada bengkel berkala untuk pelajar yang pintar cerdas dan penglibatan mereka dalam penyelesaian masalah masa depan dan sebenar. Penyediaan dan latihan guru-guru berbakat pada program TRIZ diperlukan.

EFFECT OF TRIZ PROGRAM ON CREATIVE THINKING SKILLS AND DECISION- MAKING SKILLS AMONG GIFTED STUDENTS IN SAUDI ARABIA

ABSTRACT

This study aimed to identify the effect of the TRIZ program on creative thinking and decision-making skills among the gifted students in Saudi Arabia. This study intend to answer research questions that include the level, the relationship between these two skills, the effect of TRIZ program and viewpoints of gifted students regarding the effect of the TRIZ program on these skills. This study used the mixed methods research. The study sample consisted of 1st grade secondary gifted students. They were distributed into two groups: an experimental group and a control group. The researcher used TTCT and Tarawneh Scale (2006) to measure the skills of decision-making. Statistical methods were related to frequencies, percentages, means, standard deviations of the gifted students' scores in the total and sub-scores in the creative thinking and the decision-making skills scales. Pearson correlation coefficient was calculated to find a correlation between the creative thinking and the decision-making skills. The analysis of covariance ANCOVA and the multivariate analysis of covariance MANCOVA were used to judge the significance of differences between the experimental and control groups in the total and sub-scores. The study results showed that there is a decrease in the level of creative thinking skills among gifted students. The results also showed that the level of decision-making skill among the gifted students was at average level. With respect to dimensions, the level of decision-making skills was average in four dimensions and low in four other dimensions. The results showed a high positive correlative

relationship between the total score on the Torrens creative thinking scale and the decision-making skills scale. The results also showed the effect of the TRIZ program on creative thinking and decision-making skills among the 1st-grade secondary gifted students in Jeddah Province, either at the total score or sub skills of the creative thinking and decision-making among the experimental group. This study recommends the need to employ the TRIZ program in the educational process by incorporating the principles of the theory of creative problem solving TRIZ within the Ministry of Education curriculum, so that it can help the gifted students develop their creative thinking and decision-making skills. It also recommends the importance of providing enrichment programs for gifted students in the development of creative thinking and decision-making skills independently from the curriculum, in addition to periodical workshops for the gifted students and their involvement in the development of solutions for future and real problems. Preparation and training of teachers of gifted students on the TRIZ program are necessary.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Currently, contemporary societies are witnessing an increase in scientific and technical developments, inventions, and innovations that manifest in various aspects of social life, encouraging these societies to keep pace with such advancements. In addition, manpower received increased attention when advanced societies realized that real investment should be placed on the capacity and capability of gifted people, who are considered as the fundamental pillar of development and prosperity (Al-Johani, 2012).

Nations are competing in caring for their gifted citizens. Bayoumi (2000) mentioned that the United States paid high attention to the gifted by increasing the number of education programs and schools such as the Marin School for Gifted Education. In Australia, a program for students with superior intellectual ability was accredited for implementation by seven different schools. In Britain, private schools for the gifted were established including the Belen School for Gifted (Singh, 2013). In Japan, an educational system based on the provision of various educational programs to meet different abilities of the gifted was developed (Linn, 2000). In the Arab world, immense efforts were exerted for giftedness (Aljughaiman & Berki, 2013). Historically, Egypt (1959) for example, established private classes for the gifted, and Jordan adopted the private school system such as The Jubilee School (Vogeli, 2015).

On the other hand, Al-Ghalib (2005) stated that Saudi Arabia plays a prominent role in providing various opportunities necessary for the talent growth of gifted people in the public program framework through the educational policy adopted by the Council of Ministers Resolution No. 779 dated 16/9/1389 AH, which stresses the detection and cultivation of the gifted. From 1989 to 1995, King Abdulaziz City for Science and Technology Department supported official efforts for the gifted in cooperation with the Ministry of Education and the General Presidency for Girls' Education. These efforts included the fully integrated research project, "The Gifted Detection and Cultivation Program," which prepared intelligence and creativity standards that included two pilot enrichment programs in science and mathematics. Moreover, the Saudi Ministry of Education established a gifted detection and cultivation program, which has been applied in schools to provide necessary human resources and potential. In 2000, the General Directorate of Gifted Care at the Ministry of Education in Saudi Arabia was established to oversee a group of centers for the gifted in all areas of the Kingdom, followed by the establishment of King Abdulaziz City for Science and Technology and its companions, which focused on giftedness and creativity.

Though giftedness and creativity was the attention, the interest is currently no longer limited to making educational efforts in gaining the aimed knowledge, information, facts, and concepts but goes beyond improving thought processes and point of views. The interest paid to enhance these aspects started long time ago in modern education history. Al-Johani (2012) mentioned that Dewey (1933) realized individuals are born with the ability to think and confirmed the role of educators in training individuals to think in a good manner. Piaget (1958) confirmed that the main

goal of the education process resembles (look like) the creation of a human capable of innovating things instead of repeating what the preceding generations accomplished; the other goal is the reformation of different and critical brains, and not the passive ones that only receive what is offered (Jarwan, 2010).

Increasing the attention on gifted students locally and internationally is considered a positive indicator of giving care to this group of individuals. However, concern on the needs and problems encountered by gifted people were not appropriately included in research (Al-sarour, 2014). This argument can be attributed to the mistaken belief that the gifted are not in need of care and support as they have abilities that develop automatically within themselves without the aid of others, a manner that somehow enables them to excel with no difficulties and to overcome obstacles (Jarwan, 2010). These mistaken assumptions may be the worst situations encountered by gifted students because, in reality, the gifted face numerous problems and challenges that may facilitate limited thought processes and wrong decision-making. Gifted students are vulnerable to different types of problems, which range from simple ones that can easily be handled to severe ones with dangers and consequences that require interference. These problems usually emerge from a surrounded environment represented mostly in emotional, social, family, and academic aspects given that most of these are caused by the unavailability of an apt environment that properly support and invest in the abilities of gifted students (Gagne, 2005).

Scientific and technological advancements in a rapidly changing world have become the basic pillars of industrial and economic progress. Hence, the

development of the skills and the naturally extreme potentials of gifted people are very important, as they are considered a national fortune possessing efforts for progress in society (Al-Sulaiman, 2006). Teaching creative thinking and decision-making skills to talents is vitally important, as they are the real wealth of society, pioneering the various areas of development in thought, science, and art in their countries. Gifted education is one of the fundamental areas used to draw the future scientific, professional, and social life of the gifted (Al-Johani, 2012). The foundation of the success of today's generation is not represented in what they memorize and acquire from school subjects but in the good thinking habit they learn that allows them to analyze any problem scientifically and subjectively, leading to correct decisions (Wood, 2010).

Good thinking is considered a resource that provides gifted students with a group of strategies that help them to interact and deal with the environment they belong to, to address problems, and to make good decisions (Jarwan, 2010). Thinking is of the highest ranks of psychological processes through which we can reach abstract levels that are more complicated relative to the meanings of things and events, as well as the relationships that exist in between them, to practically and scientifically overcome difficulties and obstacles (Piaget, Inhelder, & Piaget, 2013). The thinking skills of gifted students enhances their maturity in facing difficulties and obtaining better results than those acquired without thinking; this means that good decision-making depends principally on creative thinking (Karnes & Bean, 2014).

Creative thinking provides gifted students with the ideas necessary to transform subjects from traditional to modern, to promote compatibility and to conform with the standards of modern societies. Creativity is the ability to generate innovations in a shape of a piece of art, an idea, a theory, a statue, or an invention, and creative works are only made by creative persons with their own unique characteristics and thoughts, which are found among gifted students (Al-Subaiei, 2011). The product of creative thinking is uniquely characterized by originality, flexibility, fluency, and elaboration, as well as novel and highly diverse ideas, multiple general thoughts related to the situation, and development and improvement of an existing object. Gifted people represent the hope of a nation as they can take care of themselves and their societies toward the highest ranks of development and human civilization (Wood, 2010). Creativity is an effective means of reducing the civil and scientific gap between nations, and it plays a decisive role in the development of societies in all human fields (Csikszentmihalyi, 2014). Creativity also represents a highly valuable form of human effort, which facilitates the self-actualization and personality development of gifted students, which helps shape ideas and relationships (Ibrahim, 2000), offers many available alternatives to problem solving and decision-making, avoids the logical successiveness and the processes of comparison and choice, and directs attention into a new thinking path thereby avoiding the classic thinking pattern (Al-Qadafi, 2013).

The interest of human societies in creativity results in the advantages brought about by the modern time characterized by scientific breakthroughs, technological advancement, knowledge explosion, rapid progress, and increased thinking and

social basic needs that provide new anti-routine ideas leading to creative decisions (Al-Saeidi, 2007).

The development of thinking skills in general and creative thinking skills in particular of gifted students will increase their self-confidence, lead to compatibility in their cognitive structures, and provide them with many scientific and practical methods in facing problems, as creative thinking skills are strategies for generating unfamiliar and unprecedented, new solutions to reach creative decisions (Jarwan, 2010). The development of these skills creates renewal and improvement that enhance performance, help gifted students overcome problems, and make right decisions; improving thinking and decision-making skills by enhancing scholastic tools, habits, styles, and methods are fundamental in a productive educational process (Abu-Gado, 2005). Decision-making is vital in the lives of gifted students and entails a great deal of thinking and emotional energy that relies on scientific bases, to the extent that no human function in need for this much energy more than decision-making. The usage of this thinking energy on scientific and practical bases leads to good decisions. This importance guided researchers to study the processes of creative thinking and decision-making with all their dimensions, aspects, and skills (Al-Johani, 2012).

Creative thinking skills can help gifted students improve their problem solving abilities, and it is considered one of the higher-thinking skills. Hence, what suits creative thinking skills in relative to learning and training may also be appropriate for decision-making skills. The need to teach and improve creative thinking and decision-making skills became more important especially at present (Dixon et al., 2004). De Bono (2003) stated that the integration of thinking teaching

in scholastic subjects is considered an educational necessity that must be considered to create a thoughtful generation.

1.2 Background of the Study

Background of the study will discuss aspects of gifted programs, enrichment activities, and creative thinking. The gifted programs vary, and many of which appear to include different contents but, to a large extent, agree in one main objective, that is, to develop the abilities of gifted students to the possible maximum extent (Al-Sulaiman, 2006). Some studies confirm that educational programs for the gifted may be classified into three main types: enrichment, acceleration, and counselling (Dai & Chen, 2013).

Enrichment among gifted students is one of the methods employed by gifted institutions to provide students with relevant educational services and programs, such as a homogeneous group, in a manner better than that delivered in the regular classroom (Colangelo & Davis, 2002). The enrichment approach to gifted education is common in public school systems where gifted education is valued but funds are not available, or resource are not merited, to support stand-alone gifted education programs. Where only the top 1 to 2% of students are recognized as gifted, it is difficult for many schools in Saudi Arabia to allocate additional resources to support full programs for a select few (Renzulli, 2012). Enrichment is the same in Saudi Arabia. Enrichment may include specially designed assignments, or curriculum, provided to gifted students within a regular classroom setting with other students. Alternatively, it might include more form programs (Subotnik, Olszewski-Kubilius, & Worrell, 2011).

Acceleration among gifted students is the practice of giving students material and assignments that are usually reserved for students who are older or in higher grades. This means it involves the use of existing school curricula, although it may also include additional materials. For example, acceleration may involve assigning a fifth-grade student the curriculum topics that are usually covered in a sixth-grade mathematics class, even if the actual problems or text are slightly different (Robinson, 2004). Acceleration is most meaningful among gifted students when a school district has a well-established curriculum and the successive years of school involve steadily increasing levels of difficulty. Acceleration also implies that academically advanced among gifted students will progress faster through the school system than other students. It means adapting curriculum to the gifted student's assessed level of mastery, rather than insisting that a single curriculum is appropriate for all students of the same age. It also implies that gifted students who master more advanced subjects will receive academic credit and promotion based on their level of mastery, not the seat time spent in their schools (Colangelo, Assouline, & Gross, 2004).

Counselling gifted students is one of the most challenging and rewarding functions for a counsellor in Saudi Arabia. Gifted students have great inconsistency not only in their cognitive capacity but in their effective development. While there are clearly common themes to the social-emotional issues confronting gifted students, there are deep individual differences among gifted students (Colangelo & Davis, 2002). The school counselor is to help gifted students to recognize who they are, make decisions, and develop their potential. Gifted students need the assistance and nurturing counselors can provide. It will be a sign of effective schooling when

counselors regularly use their skills and expertise with gifted and talented students in their schools (Elijah, 2011).

The researcher believes that the processes of creative thinking and decision-making are not arbitrary but has many goals to achieve. Whether the situation is normal or fateful, creative thinking is a must to solve any problem the individual faces; thus, it requires considerable time and intellectual effort.

The attention paid to creative thinking and decision-making at all levels indicates the high value of the two factors, and the development of creative thinking and decision-making, which also help work and self-confidence; thus, the decisions caused by both processes are of great value for the personal, professional, and social life of an individual; accordingly, the good decisions provide individuals with self-confidence and motivate him/her to further achieve and reach aspiration through development of skills (Rizkullah, 2002).

The development of creative thinking involves the process through which the trainer, whether a teacher, an educator, or anyone else, teaches trainees to engage a feeling toward problems, to perceive missing elements, aspects, and gaps in the information they receive and to search for distinguished solutions regardless of the normal ones (Al-Rafi, 2007). Researchers in the fields of thinking and development (Gordon, Rossman, Osborn, De Bono, and Fisher) agree upon multiple methods and programs, through which creative thinking skills are presented; these studies confirmed the importance of creative thinking and training to prepare creative minds handle different and complicated life problems (Al-Johani, 2012).

Results of several studies on the creative thinking method such as De Bono's study (1998) indicated that thinking is a skill that can be learned through training and practice, whereas Beyer (2001) stressed that creative thinking programs remarkably change academic achievement and raise learning experience; this outcome motivates independent thinking and initiatives and motivates students to apply what they learned in reality, thereby allowing creativity. The international programs and strategies that have been proven effective to develop thinking include Creative Problem Solving Theory in Russian, Teoria Reshenigy Izobreataekikh Zadatch (TRIZ). TRIZ, which was laid down by the Russian Henry Altschuler of the former Soviet Union, TRIZ can be used in teaching and learning creative thinking skills, which eventually leads to proper problem-solving and decision-making. The mentioned theory is among the relatively modern theories in the field of creativity; it dates back to the 1940s but only became widely known in the last decade of the 20th century after the collapse of the Soviet Union and the migration of scientists to various countries worldwide (Skrupskis & Ungvari, 2000).

1.3 Problem Statement

The problem statement in the study is outlined as below:

1.3.1 Level of Non-Practice Creative Thinking and Decision-Making Become Main Issues among Gifted Students in Saudi Arabia

The survey on creative thinking and decision-making skills was conducted in Saudi Arabia and was answered by 24 teachers of gifted students (Ministry of Education, 2013). Results showed that gifted students have difficulties in practicing and using creative thinking skills in the first

rank, decision-making skills in the second rank, and critical thinking skills in the third rank. The following chart shows the survey results:

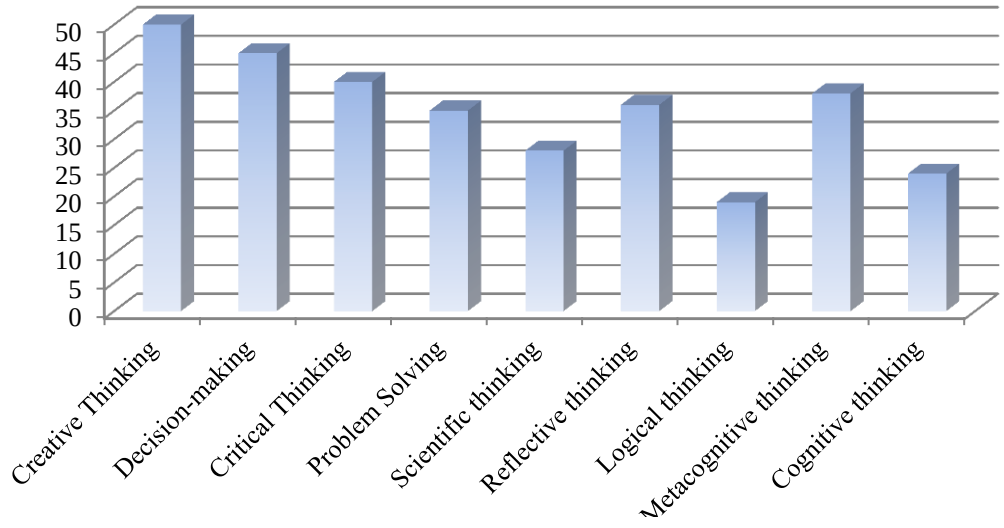

Figure 1.1 Survey results process

This finding shows that the level of non-practice creative thinking and decision-making is very high compared to other skills.

Al-Harbi (2010) pointed to the importance of developing creative thinking among gifted students. It was found that the level of creative thinking is low among gifted students and has not reached the level that enables them to use their skills in creative thinking, as well as the lack of programs that help develop creative thinking among gifted students. In terms of decision-making, Al-Enezi (2007) pointed out that the decision-making level of gifted students is not used. Most of their decisions are random and are not based on a valid scientific basis. They also found that their decision-making level is low and does not help in making sound and sound decisions.

The general objectives of Article No. 57 of the education policy in the Kingdom of Saudi Arabia, which was circulated in 1969, indicates the detection and cultivation of the skills and abilities of gifted students. The specific objectives of Article Nos. 192, 193, and 194 confirm that the detection and provision of private programs necessary to develop the abilities and talents of gifted students instead preparing all means of scientific research to help highlight their abilities (Al-Hogail, 2003). The objectives of meeting the needs and desires of gifted students have not been achieved, and they were not given enough opportunity to highlight their skills and abilities, perhaps because of the lack of thinking development programs focused on gifted students and the absence of relevant curriculum and teaching methods. Therefore, the outcomes are not compatible with the desired knowledge explosion and solution in facing contemporary problems, and the objective to meet the needs of gifted students failed, which wasted their abilities and talents (Al-Rafi 2007).

On the other hand, De Bono (2003) thought that the integration of thinking teaching in academic subjects is a matter of demand that cannot be neglected if educationists want to have a thoughtful generation. According to several research results, the efforts used to teach thinking skills are mostly successful, and their results proved that thinking is one of the skills learned through training and practice, as mentioned in De Bono's study. Several studies, most important of which are Byer's and Costa's, noted that thinking learning programs considerably changed academic achievement and provided students with meaningful educational experiences, independent thinking, and

initiative actions. In addition, students applied what they learned in real life, and many are given opportunities to innovate.

Teaching creative thinking and decision-making skills to gifted students of different ages is a vital goal based on the results of some experimental studies conducted in foreign environments, such as the studies of Zlontin and Zusman (1999), Vincent and Mann (2000), and Abu-Gado (2005), which used most modern thinking teaching programs TRIZ program and employed the same creative thinking development and abilities of the gifted students.

The gaining of creative thinking skills among gifted students increases their self-confidence, integrates their cognitive structure, and opens many paths in dealing with encountered problems. Thinking creatively is a strategy to generate new solutions in unfamiliar and unprecedented means and to reach creative decisions. Furthermore, increased creative thinking skills lead to renewal that enhances performance and raises competencies of gifted students who can compete through generating ideas, solutions, and creative decision-making (Jarwan, 2010). This finding is confirmed by many studies that focused on the importance of teaching these skills to students and in dealing with decision-making. Reports that parents and teachers should train the decision-making skills of students, whereas Gregory and Clemen (2001) believe that learning decision-making skills is essential in effective education as it improves the performance and scholastic habits of students (Abu-Gado, 2005).

Akin states that creative thinking and decision-making skills can help gifted students develop their problem solving abilities, whereas decision-making skill is one of the higher-order thinking skills; what applies to creative thinking in terms of learning and training also applies to decision-making skills (Al-Tarawnah, 2006).

1.3.2 The Relationship Between Creative Thinking and Decision-Making Skills Do Not Exist and Still Based on Traditional Methods among Gifted Students

The creative thinking and decision-making skills relationship are not exist and based on traditional methods among gifted students. From researcher's perspective there were many conferences on creative thinking and decision-making skills. These conferences include (1) the Summer Conference of Enrichment of Learning and Teaching and Talent Development held in the University of Kentucky in the United States (2000), the Oman Conference (2003) with the slogan, "The gifted and innovators cultivation is an Arabic priority in the era of globalization;" (2) the Fourth Scientific Conference (2005) with the slogan, "Together to support the gifted and innovators in a rapidly changing world;" (3) the Oman Conference (2006) with the slogan, "CORT in focus;" (4) the Regional Scientific Conference held in Jeddah (2006) with the slogan, "Talent cultivation is an education for the future;" (5) and the Frankfurt Conference (2007) with the slogan, "TRIZ-Conference Future; Current Scientific and Industrial Reality." These conferences recommend to teach creative thinking and decision-making skills as one set of curriculum using TRIZ program and to use it

actively in schools and universities, as well as to integrate the two skills in the curriculum, because it is faster and more effective in learning process among gifted students. The implementation of creative thinking and decision-making skills in the training program can render students open-minded to receive new ideas and to nurture creative abilities.

The results of many experimental studies conducted in the Kingdom of Saudi Arabia confirm the importance of creative thinking and decision-making skills to the related in using thinking teaching programs, to support students in adapting the requirements of their time after graduation. They also recommend designing programs to support teaching thinking and training in all academic levels (Sabri, 2013; Al-Johani, 2012; Al-Zufairi, 2011; Al-Harbi, 2010; Al-Amer, 2008; Tejjar Al-Shahi, 2007; Al-Rafe, 2006; Al-Khalaf (2005); and Al-Gara'an, 2003).

Based on the positive results of some experimental studies that used TRIZ program in foreign environments, the Arab and international curriculum conference recommendations, the research conducted in the Kingdom of Saudi Arabia, and the abovementioned survey participated by teachers of gifted students, the need to develop creative thinking skills and decision-making skills is crucial in achieving self-interest and general social interest. This development should reconsider improving and mending the educational programs, where the curricula and the teaching methods are vastly different with our goal. In addition, due to the lack of programs delivered to gifted students and the lack of studies in the Arab environment,

this research is based on the effect of the TRIZ program in creative thinking and decision-making skills in Saudi Arabia.

1.3.3 There is No Specific Program that Give Effect Based on Creative Thinking and Decision-Making among Gifted Student in Saudi Arabia

There is no specific program that focuses on creative thinking and decision-making among gifted student in Saudi Arabia gifted students in Saudi Arabia. Alamer (2014) says that gifted students showed abilities in their gifted education programs because that will challenge them in their classroom but the current programs but the present education programs were not able to enrich them especially in creative thinking skills and decision-making skills. Furthermore, these programs were not accelerated their progress in school. As stated by Alwadai (2014) a recent report on high-achieving students in Saudi Arabia, mentioned that more than 8 in 10 teachers of these gifted students surveyed noted that their brightest students were not challenged or given a chance to flourish in their classrooms especially in creative thinking and decision-making skills.

In addition, gifted students in Saudi Arabia need gifted programs such as creative thinking and creative thinking skills in many cases because the current general education program is not yet ready to meet the needs of gifted students (Hein, Tan, Aljughaiman, & Grigorenko, 2014) and due to lack of general educators training in gifted education and the pressure classroom

teachers face to raise the performance of their struggling gifted students. (Aljughaiman, Nofal, & Hein, 2015).

In this research, it is the intention of the researcher to introduce the TRIZ program because it will give gifted students a challenge in classrooms especially in creative thinking and decision-making skills. Gifted programs in TRIZ are positively influences students' futures. Several longitudinal studies in other countries such as The United States of America, Great Britain, and Japan have shown that TRIZ programs have a positive effect on students' post-secondary (Al-Abdulaziz, 2013). For example, studies found that 500 gifted students in Japan identified during adolescence who received TRIZ program through the secondary level pursued their degrees more than the base rate expectations. Al-Main said that in a follow-up report on the same study participants at age 16, 300 participants, or 63%, reported showing advanced creative thinking.

In a study looking at gifted students who participated in talent development through competitions, the researcher reported a long-term impact on these students' postsecondary achievements, with 95% of the 402 students who participated in Jeddah gifted program competitions, having bachelor degrees (Al-Zufairi, 2011).

1.4 Objectives of the Study

This study aims to:

1. Identify the level of creative thinking skills among gifted students.

2. Identify the level of decision-making skills among gifted students.
3. Determine the relationship between creative thinking skills and decision-making skills among gifted students.
4. Identify the effect of the TRIZ program on the creative thinking skills among gifted students.
5. Identify the effect of the TRIZ program on the decision-making skills among gifted students.
6. Determine the viewpoints among gifted students regarding the effect of the TRIZ program on the creative thinking skills.
7. Determine the viewpoints among gifted students regarding the effect of the TRIZ program on the decision-making skills.

1.5 Research Questions

1. What is the level of creative thinking skills among gifted students?
2. What is the level of decision-making skills among gifted students?
3. What is the relationship between the creative thinking and decision-making skills among gifted students?
4. Does the TRIZ program effect on the creative thinking skills among gifted students?
5. Does the TRIZ program effect on the decision-making skills among gifted students?
6. What are the viewpoints among gifted students regarding the effect of the TRIZ program on the creative thinking skills?
7. What are the viewpoints among gifted students regarding the effect of the TRIZ program on the decision-making skills?

1.6 Hypotheses

The current study covers the following hypotheses:

H_01: There is no significant differences exist between the control and experimental groups in the total score of creative thinking skills scale.

H_02: There is no significant differences exist between the control and experimental groups in sub-scores of creative thinking skills scale.

H_03: There is no significant differences exist between the control and experimental groups in the total score of creative thinking skills post test2 (PT2) scale.

H_04: There is no significant differences exist between the control and experimental groups in the sub-scores of creative thinking skills post test2 (PT2) scale.

H_05: There is no significant differences exist between the control and experimental groups in the total score of decision-making skills scale.

H_06: There is no significant differences exist between the control and experimental groups in the sub-scores of decision-making skills scale.

H_07: There is no significant differences exist between the control and experimental groups in the total score of decision-making skills post test2 (PT2) scale.

H_08: There is no significant differences exist between the control and experimental groups in the sub-scores of decision-making skills post test2 (PT2) scale.

1.7 Significance of the Study

The significance of the current study is derived from the essential development of creative thinking and decision-making skills. The same goal is required by the educational process, that is, to keep pace with the rapid

developments, to provide the community with new ideas, and to cope with the cognitive development and scientific progress. These cognitive development and scientific progress provide those responsible for the educational process a clear image of the significance of programs and trainings that are based on scientific principles in the development of thinking, which then contributes to the development of plans, programs, and tools that help improve creative thinking and decision-making skills. Many future hopes and aspirations are built on this development. Based on the relevant educational literature, the significance of the study is highlighted through the following:

1.7.1 Gifted Students

i. The current study, which includes training programs and practical activities, represents an opportunity to assist gifted students in creative thinking and decision-making skills. On the one hand, the development of creative thinking skills is represented in fluency, flexibility, originality, and elaboration. On the other hand, the development of decision-making skills is represented in the following factors: understanding the problem; identifying the target; thinking about the requirements necessary in the decision-making process; requesting mental help from others; utilizing alternatives generation, alternatives arrangement, and trade-offs; choosing the best alternative; implementing and converting theoretical ideas into practical applications and connecting them to everyday life; having an attentive learner who can think creatively; adapting good decisions; and handling matters positively and effectively.

ii. Helping the gifted students to bear responsibility, interact with others, make friendships, and build social relationships.

iii. Develop the creative thinking and decision-making skills of gifted students, which help them, meet the challenges of the era and keep pace with the tremendous development of knowledge, as well as to provide students a safe environment.

iv. Students are trained to handle issues and problems using new methods far different from traditional ones and to help them adapt to these methods successfully.

1.7.2 Educational Process

The significance of the current study is highlighted through two aspects:

1.7.2(a) Theoretical

i. The current study is significance as it is one of the first organized research studies that uses the creative problem solving (TRIZ) employed in the construction of a training program necessary to develop the creative thinking and decision-making skills in the educational process, especially in Saudi Arabia.

ii. The current study highlights the significance of creative thinking and decision-making skills among gifted students.

iii. This study provides theoretical and educational literature easily recovered by researchers and scholars.

iv. This work highlights theory of creative problem solving, TRIZ, which is a modern theory with field applications benefiting researchers concerned with this field.

1.7.2(b) Practical

i. The study provides a training program based on TRIZ, which helps develop the creative thinking and decision-making skills necessary in solving the various problems faced by gifted students.

ii. This study applies a training program to the target group (gifted students in the first-grade high school) under an organized plan.

iii. This work draws the attention of people working in the field of talent and creativity to employ TRIZ in the creative thinking and decision-making skills among gifted students.

iv. This study provides researchers, educators, and teachers with a fully integrated training program that contributes to the enrichment and development of creative thinking and decision-making skills in educational institutions, in partnership with schools of the King Abdulaziz and His Companions Foundation for Giftedness and Creativity and the Ministry of Education.

1.7.3 This Study is the First of Its Kind in the KSA to Identify the Effect on the Creative Thinking Decision-Making Skills among Gifted Students.

The Ministry of Education in Saudi Arabia focuses on programs that are related to mathematics and science, which has resulted in a lack of

programs that affect the improvement of creative thinking and decision making, which are important for gifted students, So this is the first of its kind in the KSA to identify the effect on the creative thinking decision-making skills among gifted students**.**

1.7.4 Results of this Study Contribute to a Better Understanding of The Creative Thinking and Decision-Making Skills, with a View to Making the Appropriate Changes that Enhance the Quality of Life of these Gifted Students.

The results of this study highlight the importance of creative thinking skills and decision-making skills among gifted students, which contributes to the improvement of training programs that help to develop creative thinking skills and decision-making skills, enhance the quality of life among gifted students

1.8 Conceptual and Operational Definitions

1.8.1 TRIZ Program

The conceptual of TRIZ program is defined as a systemized program with a humanitarian, knowledge-based approach aiming to solve problems creatively; this program includes a set of strategies and principles 40 that have been accessed from an analysis of a group of patents (Bowyer, 2008).

Operationally, it is defined as a collective training program, designed based on TRIZ, and consists of a set of behavioral activities and practices that

aims to provide gifted students with creative thinking and decision-making skills, using the TRIZ principles. TRIZ includes the following principles:

1. Segmentation, means is solving problems by dividing the system into many parts, where each one is independent of the other.

2. Extraction, means is solving problems by identifying the components that function well and can be maintained and the harmful parts or components which do not work well to separate and get rid of them

3. Combination, means is collecting objects or similar components that perform functions and processes in a manner that are close or neighboring within a sense of place and collecting or combining these objects, parts, or components in a way that they perform processes and functions in convergent times.

4. Universality, means is Making the system performs many functions or tasks or making each part performs the maximum possible number of functions, such that, the need to have other systems is lessened.

5. Inversion, means is using counter-procedures commonly used in problem-solving. If the objects or parts were fixed, then we must make them movable, and vice versa.

6. Convert harm into benefit, means is using harmful elements or effects in the environment to obtain positive effects

7. Self-service, self-service, means is making the system serves itself through assisting functions and using wasted sources and material and energy surplus.

8. Changing the color, .means is changing the color of an object or that of its outer environment, in addition to altering its degree of transparency or that of its outer environment.