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THE IMPACT OF AN ENRICHMENT PROGRAM ON UAE HIGH SCHOOL STUDENTS' CREATIVE PROBLEM SOLVING SKILLS

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United Arab Emirates

College of Education

Department of Special Education

**THE IMPACT OF AN ENRICHMENT PROGRAM ON UAE HIGH
SCHOOL STUDENTS' CREATIVE PROBLEM SOLVING SKILLS**

Alyazia Sulaiman AlShehhi

This thesis is submitted in partial fulfilment of the requirements for the degree of
Master of Education (Special Education)

Under the Supervision of Dr. Hala Elhoweris

April 2021

Declaration of Original Work

I, Alyazia Sulaiman AlShehhi, the undersigned, a graduate student at the United Arab Emirates University (UAEU), and the author of this thesis entitled “*The Impact of an Enrichment Program on UAE High School Students’ Creative Problem Solving Skills*”, hereby, solemnly declare that this thesis is my own original research work that has been done and prepared by me under the supervision of Dr. Hala Elhoweris in the College of Education at UAEU. This work has not previously formed the basis for the award of any academic degree, diploma or a similar title at this or any other university. Any materials borrowed from other sources (whether published or unpublished) and relied upon or included in my thesis have been properly cited and acknowledged in accordance with appropriate academic conventions. I further declare that there is no potential conflict of interest with respect to the research, data collection, authorship, presentation and/or publication of this thesis.

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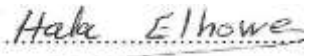
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Abstract

Training human resources to be creative and innovate in the UAE had become a significant matter recently to stay within the stage of progressing towards a more dependable economy rather than oil. Gifted and talented individuals are the country's main resources, and way to progress. This study, therefore, aims to explore the impact of an enrichment program on improving UAE high school gifted students' creative problem-solving skills. The sample included 78 gifted students from Abu Dhabi government schools. The students were grouped randomly into a control group (27 students), and an experimental group (30 students) who were exposed to a five-week enrichment program through which they practiced various strategies including SCAMPER strategy. To answer the research questions, two instruments were used including Problem-Solving Questionnaire (PSQ) and SCAMPER test. Pre and post-tests were analyzed using independent samples T-test to examine the effect of the enrichment program on the participants' level of awareness of problem solving skills and on their creative problem-solving skills. Findings of this study indicated that the enrichment program produced significant improvements in high school gifted students' creative problem-solving skills. Additionally, the awareness level of the experimental group in the problem-solving steps is significantly higher after the program. School administrators and teachers should consider using the direct instruction and SCAMPER strategies to enhance their students 'creative problem-solving skills.

Keywords: Creativity, problem solving, enrichment program, UAE, gifted high school students, SCAMPER strategy.

Title and Abstract (in Arabic)

تأثير برنامج الإثراء على تحسين مهارة حل المشكلات الإبداعية لدى طلبة المدارس الثانوية في دولة الإمارات العربية المتحدة

الملخص

أصبح تدريب الموارد البشرية على الإبداع والابتكار في دولة الإمارات العربية المتحدة أمراً مهماً للبقاء في مرحلة التقدم نحو اقتصاد يمكن الاعتماد عليه أكثر من النفط. الموهوبون هم الموارد الرئيسية للبلاد ووسيلة للتقدم. لذلك، تهدف هذه الدراسة إلى اكتشاف تأثير برنامج الإثراء على تحسين مهارة حل المشكلات الإبداعية لدى طلبة المدارس الثانوية في دولة الإمارات العربية المتحدة. شملت العينة على 78 طالباً موهوباً من مدارس حكومية في إمارة أبو ظبي. تم تجميع الطلاب بشكل عشوائي في مجموعتين: مجموعة ضابطة (27 طالباً)، ومجموعة تجريبية (30 طالباً) تعرضوا لبرنامج إثرائي لمدة خمسة أسابيع حيث مارسوا من خلالها استراتيجيات مختلفة بما في ذلك استراتيجية سكامبر، للإجابة على أسئلة البحث، تم استخدام أداتين وهما استبيان حل المشكلات واختبار سكامبر، تم تحليل الاختبارين القبلي والبعدي باستخدام عينات مستقلة من اختبار T، لمعرفة مدى تأثير البرنامج الإثرائي على مستوى وعي المشاركين بمهارة حل المشكلات الإبداعية. أشارت نتائج هذه الدراسة إلى تأثير إيجابي على مستوى وعي الطلبة بحل المشكلات الإبداعية لدى الطلبة الموهوبين في المدارس الثانوية في إمارة أبو ظبي، بالإضافة إلى ذلك، كان مستوى وعي المجموعة التجريبية بعد البرنامج أكبر من المجموعة الضابطة في خطوات حل المشكلة. يجب على مديري المدارس والمعلمين استخدام استراتيجية سكامبر واستراتيجية التعليم المباشر لتحسين مهارة حل المشكلات بطريقة إبداعية لدى طلابهم.

مفاهيم البحث الرئيسية: مفاهيم البحث الرئيسية : - الإبداع، حل المشكلات، البرامج الإثرائية،

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Dedication

My work is dedicated to my beloved parents who inspired me to start this work, and also to my sisters and brothers who have never left my side at any time.

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List of Abbreviations

ADEK	Abu Dhabi Department of Education and Knowledge
CPS	Creative Problem Solving
DMGT	Differentiated Model of Giftedness and Talent
EMSA	External Measure of Student Achievement
FPSP	Future Problem-Solving Program
MOE	Ministry of Education
PBL	Problem Based Learning
PSQ	Problem Solving Questionnaire
REAPS	Real Engagement in Active Problem Solving
SCAMPER	Substitute, Combine, Adapt, Modify, Put to Another Use, Eliminate, Reverse
SEM	School Enrichment Model
TORRANCE	Torrance Test of Creative Thinking
TTCT	Torrance Test of Creative Thinking
UAE	United Arab Emirates
WISC	Wechsler Intelligence Scale for Children

Chapter 1: Introduction

1.1 Overview

This study aimed to explore the impact of an enrichment program on improving United Arab Emirates (UAE) high school gifted students' creative problem-solving skills. This was achieved by implementing a specific enrichment program and activities. The students were exposed to a five-week enrichment program through which they practiced various strategies including SCAMPER - which stands for 'Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, Reverse' – (Tan et al., 2020) with the aim of enhancing creative problem-solving skills. This introductory chapter consists of a description of the research topic's background, statement of problem, purpose of the study, research questions, significance of the study, definitions of terms, and the study's limitations.

1.2 Statement of the Problem

To maintain its position amongst progressive countries, the UAE is moving to a future that considers creativity and innovation as a novel, more dependable economy than reliance on oil. The need to globally compete as an innovation-based economy has raised the nation's cognizance of the significance of human resources and, specifically, highly competent persons' creativity and innovativeness. Gifted and talented individuals are the country's main resources, investments, and the way to progress. Accordingly, this mission requires the UAE to establish a system that can provide a thoughtful, constant support for gifted and talented individuals. This system should enhance the country's transition from being an oil-based economy to investing in human resources – especially in the skills of gifted and talented individuals. This

necessitates adopting a sustainable approach that stimulates the highly-creative productivity of those gifted and talented people. The way to accomplish success, as typical, starts from pervading and inspiring education (Gaad et al., 2006). Generally, the extent of societal interest in the gifted is eventually reflected in the level of innovations in society - that is, in its economic prosperity. Innovation is hence strongly related to giftedness, and giftedness is closely related to economy and public policy. Therefore, developing gifted students should be among the top priorities of any government's agenda (Shavinina, 2009).

Regarding the definition of the term 'gifted', there is no one universally-agreed definition. For instance, the term 'gifted' is defined by Renzulli (2003) as those who demonstrate above-average ability, creativity, and task commitment. Gagné indicated that students' gifts are moved into talents through a developmental process. According to Gagné, 'giftedness' refers to students' outstanding natural abilities, that are called aptitudes, in a minimum of one ability domain to a degree that puts an individual at least among the top 10% of age peers; while being 'talented' refers to the outstanding mastery of gradually-improved abilities, called competencies (knowledge and skills). (Gagné's Differentiated Model of Giftedness and Talent, 2011).

According to Knowledge and Human Development Authority et al. (2015) the term 'gifted' refers to students who have high abilities in intellectual, creative, social, and academic domains (e.g. Arabic, English, Science and Mathematics) and 'talented' means students who have special abilities in one or more fields of human activity that place a student in the top 10% of age peers in that field. In this research, similar to the definition by Knowledge and Human Development Authority et al. (2005) the term 'gifted children' indicates those who can demonstrate high abilities in intellectual,

creative, social, and/or academic domains and 'talented' are those students who have a special ability in one or more fields of human activity.

To identify gifted students in Abu Dhabi schools, there are some criteria that include nomination (by parent, teacher, peer, self); ability screener tests (WISC or BETA); achievement tests (e.g., EMSA); students' performance (e.g. classroom grades); and authentic product of students' work (e.g. creative projects, real-world applications). Accordingly, gifted students must have three out of five criteria to be indicated as a gifted student (Knowledge and Human Development Authority et al., 2015).

In the same vein, the Ministry of Education (MOE) considers gifted and talented students to be those showing outstanding ability, or a great deal of willingness, in one or more areas of intelligence, creativity, or academic achievement or special talents and abilities such as oratory, poetry, drawing, handicrafts, sports or drama. (Emirates Center for Strategic Studies and Research, 2016).

Kim et al. (2010) indicated that there are many reasons to offer special and unique programs for gifted and talented students because these students have different learning needs and they always need help to improve their potential and promote their capabilities in schools. On the other hand, school programs fail to meet gifted students' needs, and the rate of change in schools, and innovative efforts on their behalf, remains slow for gifted students compared to their peers. According to Kim et al. (2010) and Renzulli (2003), learning needs of gifted students are not met, and the average percentage of change toward providing appropriate materials in schools is still behind the needs of the intellectual levels of gifted and talented students. For that reason they need special enrichment programs (Uçar et al., 2017).

1.2.1 Giftedness and Education

Gifted and talented students must be given special care and be provided with advanced expertise to develop their abilities and skills which are necessary to build the future. Gifted and talented education gives those students a chance to cultivate a society's most intellectually-promising students to realize their creative capacity and their value as human capital. There are many strategies and recommendations associated with gifted students' education. According to the exploration in the related literature, teaching tactics that maintain problem-solving skills, creative and critical thinking skills, and improve achievement are the essential elements of gifted students' education. Leaving gifted students without special care will increase the probability of losing their giftedness, whereas, when their high abilities are seriously considered, they will be very effective people (Cutts & Moseley, 2001; Çapan, 2010; Hedricks, 2009; Johnsen & Ryser, 1996; Rotigel & Fello, 2004; Yoon, 2009). To ensure that gifted students have justice in education, they should receive an appropriate and high-quality education that challenges their abilities and potential. Therefore, to meet gifted and talented students' needs, the UAE has an initiative called "School for All" (AlGhawi, 2017). This initiative considers the learning needs for all students including low achievers, medium and gifted students. This initiative is closely related to the six goals in the MOE strategy 2010–2020 (AlGhawi, 2016). The main goal of the initiative is to enhance the principle of equity for all students in respect to providing educational opportunities, fulfilling gifted students' needs according to the strategic plan of the MOE.

Teaching instructions for gifted and talented students in the UAE were introduced in the year 2000 when the MOE started offering gifted education programs at school. To

date, there are no laws that state specifically to provide services for students identified as gifted and talented in the UAE (AlGhawi, 2017).

Scholars have indicated that the curriculum for gifted learners should be differentiated. For example, VanTassel-Baska et al. (1994) clarified that there are several reasons to recognize why gifted students are in need of a differentiated curriculum. Usually, gifted students necessitate provision of a special education program adapted to their learning requirements because they typically fail to develop their potential and have their capabilities nurtured in general education classrooms due to regular school programs failing to meet their needs. The pace of change in school and innovation efforts are regarded to be slow for gifted learners when compared to others. There is a mismatch between the academic needs of gifted students and the pace and depth of the curriculum and instructional program. Moreover, the performance of gifted or talented students is so exceptional or advanced that they require special provisions to meet their educational needs in general education classrooms with support from special education teachers and resource room teachers (Brearly, 2019). Brearly (2019) also indicated that providing gifted and talented students with enrichment programs could be very beneficial because enrichment programs can give students a chance to try new things and explore various domains to improve their interests outside the classroom. Additionally, enrichment programs could help gifted and talented students to improve their thinking toward learning, learning in their own time, extending their mind and acquiring the important skills that will assist them in their academic and professional jobs (Brearly, 2019).

The MOE in the UAE provides various services to gifted and talented students such as enrichment programs. These programs take account of the various interests and

needs of students of all cycles, and it achieves their wishes and goals. These programs are related to the culture and values of the UAE. Additional services include assigning students individual projects and studies, specialized educational tours, attending lectures, debates, educational seminars, participating in educational competitions, providing students with programs to solve problems, programs of leadership, communication and computer skills, and other such enrichment programs (The Ministry of Education Organizes Various Enrichment Programs, 2017). The common practice in UAE schools to accommodate the educational and developmental needs of gifted and talented students is the use of acceleration, enrichment programs and grouping activities (Obaidli, 2006). Acceleration occurs when students move through the traditional curriculum at faster rates than is typical. Enrichment is any type of learning or activity which is outside the core of the learning which most students undertake. It is additional to the established curriculum. Examples of the enrichment programs in UAE government schools include offering programs that focus on thinking skills including critical, creative and problem-solving skills. Also, gifted and talented students may go to summer camps to enrich their skills and gain some unique skills. There are some programs that focus on specific strategies such as scientific research and modeling.

Creativity is an important skill to develop gifted and talented students' ability to learn new scientific knowledge. According to Gray (2016), there are many reasons to teach creativity to students such as stimulating thinking, supporting original thinking, encouraging students to be motivated, changing the curriculum to be more creative, teaching problem-solving methods and producing new and creative and unique ideas. Problem-solving strategies is one of the most effective ways to teach gifted and talented students: it is different to other strategies as it allows them to think and

imagine - which makes the student consider issues and problems, and future solutions for them (Guido, 2016). In addition to that, teaching gifted and talented students problem-solving abilities helps these students to increase their memorization and retention abilities, allowing students to discuss their ideas and challenge each other in constructive ways, and it leads to development of transferable skills as students can transfer what they learn through problem-solving strategies to their peers and enhance their interpersonal skills and teamwork abilities including working with others who have the same abilities and interests (Guido, 2016) .

1.2.2 Giftedness and Creative Problem Solving

Gifted students have problem-solving abilities which make them different from their peers (Uçar et al., 2017). Offering enrichment programs including problem-solving is very important for gifted and talented students. If a school does not offer this kind of program for gifted and talented students, they will have some disadvantages that affect their levels. Therefore, schools need to include enrichment activities for them. In the case that gifted and talented students do not receive enrichment activities or programs, they may face some problems including negative self-concept, struggling in general education, getting bored quickly and having trouble focusing. They quickly lose interest because they are not challenged or motivated. Therefore, rather than losing these gifted individuals, and their learning environments, the situation should be well-prepared (Çapan, 2010). Based on the related literature, the best strategies to deal with gifted and talented students are those which support problem-solving skills, and critical and creative thinking skills (Ya, 2019). That is why strategies are very important and useful, especially when educators want to plan the teaching program and rules for gifted students (Ya, 2019). Gifted and talented students are special in

their learning, as stated by Slavin (2018), who points out that the aims of teaching problem-solving strategies systematically is to raise the level of advanced thinking, generate the concept of understanding, and help students to apply the concept and principles to any problems. Also, problem-solving strategies have many benefits such as helping students in transferring information and building knowledge, increasing the skills of thinking, generating the concept of understanding and assisting students to apply the concept and principles to any problem (Pratiwi et al., 2018).

Bingham (1958) defines problem-solving practice as spending efforts to deal with difficulties to achieve a particular aim. Likewise, Wilson (2000) defined problem-solving as a way in which the student obtains a solution by carrying out a distinguished plan through using thinking, and reasoning during this process. Correspondingly, Heppner and Krauskopf (1987) defined problem-solving as a procedure to develop ways to defeat troubles during accomplishing a specific goal. Along with Toluk and Olkun (2001), problem-solving skills refers to the ability of students solving the problem in the specific situations according to their experience and knowledge. Students apply their own imagination, creativeness, and knowledge during problem-solving processes (Çakıroğlu et al., 2011).

According to the studies of AlDhaimat et al. (2020) problem solving is found to be a good method for improving gifted students' abilities to understand the problem and solve it in creative ways. Moreover, this kind of program leads to gifted students having more self-learning, improving ways of thinking, enhancing their motivation and positive attitudes towards learning, increasing effectiveness, dealing with technology; and to creating more interesting environments in learning, and achieving

continuous learning. For example, thinking outside the box is very effective for all students including gifted students.

1.2.3 Impact of Enrichment Programs

There are many advantages of giving enrichment programs to gifted and talented students. It allows them to follow their study, have more understanding of the materials, and improve their information in the subject matter (AlDhaimat et al., 2020). Ceylan (2020) examined the effect of the waste management themed summer program on gifted students' environmental attitude, creative thinking skills and critical thinking dispositions. In his research, the participants were 29 gifted students from grade five. The aims of the study were to examine the impact of the summer program prepared with the theme of waste management on the environmental attitudes, creative thinking skills and on the critical thinking dispositions of fifth grade-gifted students. The researcher used a pre-posttest. Finding of this study indicated that the summer programs offered for gifted students outside the school environment provide good attitudes and cognitive improvement of gifted/talented students.

Comparing the experimental and control groups, Cetinkaya et al. (2015) found out that gifted students of the experimental group who were using creative thinking skills had higher scores in some dimensions - such as creativity, problem solving and self-efficacy - than the control group students. Additionally, several studies (e.g. Reis & Renzulli, 2010; Kashani-Vahid et al., 2017) revealed that problem-solving is a good method for improving gifted and talented students' abilities to identify the problem and solve it in a creative way. Also, this kind of program leads gifted students to have more self-learning, improve their ways of thinking, promote their motivation level, and increase their positive attitudes towards learning.

There are several studies that investigated the impact of an enrichment program on gifted learners (e.g., Christensen et al., 2015), but to date in the UAE, to the knowledge of the researcher, no study has been found that investigated the impact of an enrichment program on UAE gifted high school students' creative problem-solving skills. In order to fulfill UAE gifted high school students' potential in thinking skills, the major objective of this study is to examine the implementation of an enrichment program on UAE gifted high school students' creative problem-solving skills.

1.3 Statement of the Problem

Gifted and talented students may have many problems that make them bored both inside and outside school including environmental, social, emotional, and educational problems (Heylighen, 2019). For example, academically-gifted students face difficulty with the regular class curriculum because they are cognitively ahead compared to their same-age peers. Additionally, gifted learners may experience other emotional problems like perfectionism and mastery drive which is one characteristic seen in gifted students which makes them want to be perfect in all school activities that include their needs and interests which leads them to complicated, stress-related behavioral issues that are a challenge for all to solve (Hertzog & Beltchenko, 2007). Therefore, gifted, and talented students need special enrichment programs to reach their full potential. Additionally, if gifted and talented students do not receive enrichment activities or programs, they may face some problems including negative self-concept, struggling in general education, getting bored quickly and having trouble focusing in school (Heylighen, 2019). Ultimately, they can lose interest because they are not challenged or motivated.

Gifted and talented students need to be taught creatively and challenged with a problem-solving program. A number of scholars in gifted education (Cetinkaya et al., 2015; Maker, 2020; VanTassel-Baska, 2020; Renzulli, 2020) reported that the effect of enrichment creative and/or problem-solving programs was effective in developing gifted students' creative problem-solving skills. Additionally, these scholars emphasized that creative thinking practiced while solving problems can definitely promote gifted students' problem-solving skills and self-efficacy (Cetinkaya et al., 2015).

Gifted and talented students have a lack of problem-solving skills and they need more attention to acquire these skills and to use them in their real life. Teaching gifted and talented students problem-solving skills in explicit ways is also very effective. In addition to that, gifted and talented students lack higher-order thinking skills and the school needs to teach them directly (Nugroho et al., 2020).

Very little research has been conducted on the education of gifted students in the Arabian Gulf region, particularly in the UAE. A few research studies were found in the UAE including studies on gifted education in the United Arab Emirates (AlGhawi, 2016, 2017); dual exceptionality (Efthymiou & Elhoweris, 2015); teachers' perceptions of gifted students (Jarrah & AlMarashdi, 2019); effect of the label "giftedness" on United Arab Emirates pre-service teachers (Elhoweris, 2014), and gifted education in the Middle East (David, 2018). However, to date in the UAE, no study has been found that investigated the impact of an enrichment program on UAE gifted high school students' creative problem-solving skills. Therefore, the major objective of this study was to examine the implementation of an enrichment program on UAE gifted high school students' creative problem-solving skills.

1.4 The Purpose of the Study

Given the scarcity of literature on enrichment programs in teaching gifted and talented students in the UAE context, this study aimed to explore the impact of implementing a five-week enrichment program on improving gifted and talented students' creative problem-solving skills. Additionally, this study intended to find whether there is any statistical differences between the pre and posttest after carrying out the enrichment program. Furthermore, the current study intends to reveal the gain made, if any, by the students after having the enrichment program in respect to creative problem-solving skills.

1.5 Research Questions

1. Are there any statistical differences between the experimental group (which received the enrichment program) and the control group (which did not receive the enrichment program) in the SCAMPER post-test?
2. Does the enrichment program significantly improve the creative problem-solving skills of UAE gifted high school students?
3. Are there any statistically-significant differences between the control group's (which did not receive the enrichment program) and the experimental group's (which received the enrichment program) awareness of problem-solving steps before and after the implementation of the enrichment program?
4. Does the enrichment program significantly improve the awareness of problem-solving steps of UAE gifted high school students?

1.6 Significance of the Study

The results of this study will be of significant benefit for many reasons. Despite the fact that several studies were conducted in the Gulf region and, specifically, in the UAE - and their focus was on gifted and talented students - none of them targeted exploring the impact of an enrichment program on UAE students' creative problem-solving skills at the high school level. Therefore, the results of this study will add to the literature on investigations about gifted and talented students' creative problem-solving skills. The positive results of implementing an enrichment instructional program will draw stakeholders' attention to the fact that gifted and talented students need to be supported with special enrichment programs in various skills which enable them to reach their potentials. Therefore, those students' care must not be left to chance without a particular plan, and it is better to be directed and guided by laws that ensure the government's investment in their gifts. In addition to that, interested teachers will find this study as a clear and easy resource that may help them to enrich their gifted students' creative problem-solving abilities.

1.7 Limitations of the Study

This study attempts to explore the impact of an enrichment program on improving UAE high school gifted students' creative problem-solving skills. To realize the purpose of the study, the researcher selected the sample conveniently and purposively and mainly based on their availability. This may lead to limiting the ability to generalize the study results because the study was only applied to 30 tenth grader female students (participants in the experimental group) in one government school. Furthermore, the number of the sample is considered to be small, especially in relation to conducting quantitative studies – a larger sample size may more-strongly support

the reliability of the results. Additionally, the enrichment program was carried out within a short time frame of five-weeks which may also limit the depth of understanding of the impact of this program.

1.8 Definitions of Terms

Creativity: Creativity is being able to exceed traditional methods of thinking or acting, and to improve new and original ideas, methods, or objects. Creativity is a skill that leads the person to understand the world and connect their observations to existing knowledge and information. It has specific characteristics such as flexibility, fluency, and elaboration. (Moor, 2019).

Creative Problem Solving: Creative Problem Solving, or CPS, means using of innovation and imagination to explore or find solutions to problems. It is a way to challenges students to think outside the box beyond the traditional thinking (Cummins, 2020).

Enrichment Programs for Gifted and Talented Students: The term ‘Enrichment’ “refers to richer and more varied educational experiences, a curriculum that is modified to provide greater depth and breadth than is generally provided” (Davis & Rimm, 2004, p.120).

Gifted and Talented Students: Gagné (2004) defines gifted students as those who have high levels of intrinsic aptitude, in the least at a domain of human ability, that puts them among the top 10% of their peers of the same age—even though their high potential is not yet being developed in the form of high performance. Contrastingly, talented students are those who have abilities that have already been converted into accomplishments, and who are already performing at a level that locates them among

the top 10% of their age peers. Therefore, gifts are innate abilities while talents are skills developed in a systematic way.

Problem Solving: Wilson (2000) defines problem solving as “the process by which a student arrives at a solution to a problem. Integral to this are students’ thinking, planning, reasoning, and executing of the plan as they progress from the initial problem state to the fulfillment of their goal”. Additionally, Bingham (1958) indicated that in the problem-solving process some common steps are frequently practiced: problem identification, problem clarification, collection and organization of data, possible solutions determination, and evaluation of solutions.

Chapter 2: Review of the Literature

The main purpose of this chapter is to review studies that tackled the importance and impact of enrichment units on gifted students' creative problem-solving skills. This chapter is divided into five main sections including the theoretical framework about Gagné's theory, definition of giftedness, major characteristics of gifted students, types of enrichment programs and their impacts on improving gifted and talented students' creative problem-solving abilities; and summary of the literature review.

2.1 Theoretical Framework

There are many theoretical conceptions of giftedness. Francoys Gagné is one of the most prominent scholars who defines giftedness. Gagné is a French Canadian scholar who proposed a theory of talent development called the Differentiated Model of Giftedness and Talent (DMGT) (Gagné, 2004) . This theory proposes a clear distinction between the two most basic concepts in the field of gifted education. The two basic concepts include giftedness and talented. Giftedness refers to outstanding natural abilities, called aptitudes, in at least one ability domain, to a degree that places an individual at least among the top 10% of age peers. Talent shows the outstanding mastery of gradually-developed abilities, - called competencies - (knowledge and skills), in at least one field of people's daily activity to a degree that places an individual at least among the top 10% of age peers who are or have been effective in that field. According to Gagné, giftedness is a top natural ability whereas a talent is an ability or skill that has been improved especially well. From this situation, a talent is a gift, but a gift does not automatically mean a talent.

Gagné believes that a student starts with gifts and has the chance to improve talents through a variety of different “catalysts.” These catalysts contain interpersonal factors like maturity, motivation, interests, chance, and environmental factors like family and school. According to Gagné, a student may be born gifted, but if these gifts are not appropriately cultivated, they will not develop into fully-formed talents. For example, a student who is gifted in art but did not receive any training: these gifts will not be realized and, potentially, not even noticed at all. Gagné also said that a student who may be talented at age 10 may not continue to be talented at age 20 if their performance is no longer superior. That means according to the age factors, the student may become talented in a period of time according to their peers in that age, but after period of time, this talent may disappear because of performance relative to one’s peers or expectations. (Gagné, 2004); Gagné’s Differentiated Model of Giftedness and Talent, 2011)

Gagné’s (2004) model officially acknowledges the effect on natural abilities and catalysts: not all students have enough access to, or the ability to participate in, intervention and strategies. Also, some gifted students may require different forms of intervention from intrapersonal and environmental catalysts to be able to fully achieve their potential. In this model, natural abilities, or aptitudes, act as the “base line” or the essential elements of talents. It follows from this that talent necessarily implies the presence of well-above-average natural abilities; one cannot be talented without first being gifted. The opposite is not true, however. It is possible for well-above-average natural abilities to remain simply as gifts, and not to be transferred into talents, as is evidenced by the well-known phenomenon of academic underachievement among intellectually-gifted students. The process of talent development proves itself when

the students engage in methodical learning and practicing in school activities (Gagné, 2004).

Gagné (2008) indicates that talent development should be based on features, proposing that, if gifted programs followed Gagné's theoretical model (DMGT), academic training would be much more principled. Although these ideas seem suitable for the development of gifted programs, the DMGT model is partial towards the individual, based on assumptions that gifts and talents are possessed or gained or by individuals.

There are four components that are related to the DMGT theory including Gifted, Intrapersonal, Developmental Process and Environment (G, I, D, E)). Let us start to talk about giftedness and how it is related in this theory. The gifted component is divided into six categories including: mental intellectual (GI), creative (GC), social (GS), perceptual (GP), physical abilities (GP) and muscular (GM) abilities. According to this theory, the student could start from a gifted point, meaning each student will have their natural abilities or aptitudes and they will be improved within a period of time. Also, Gagné model has other components, which include Intrapersonal, Development Process and Environment. These components affect gifted students and lead them to become talented. For example, the environment is a very important factor that may affect a gifted child. So, preparing a good environment with all the resources for a gifted child may affect him to become a talented child. In the Gagné model, the activities such as drawing or playing sports have a program which needs content and a good environment. Also, the activities may include be independent study, or take place within a formal organization like school. The third and fourth components are I and E which are called Intrapersonal and Environment.

The Environment component includes three factors which are environment milieu (EM), environment individuals (EI) and environment talents (ET). The first one is called 'milieu', and it is related to the climate of the environment, and how this will be different from one child to another. It also includes environment diversity: for example, a gifted child who is born in a rural area is different to a gifted child who is born in an urban area. In addition to that, it also includes social and economic issues. The second one is called 'individuals' and it is related to the relationship between the gifted child and other members such as parents, teachers, peers, and mentors. The third one is called 'provisions'. It means all rules and regulations that are related to the gifted child program; it is related also to the curriculum, pedagogy and whether the students are put in an acceleration or enrichment program. The final catalyst is called 'intrapersonal'. Intrapersonal includes three sub-components: awareness (IW), motivation (IM), and volition (IV). It is very important for a gifted child to know about their weaknesses and strengths for it plays a significant role in the planning of talented developmental activities. The term 'motivation' refers to leading a gifted child to reach their goals and assist with their needs and values. Also, it leads them to determine their interests and potential. Talent emergence results from a complex relationship between the four causal components, a relationship that is unique to each individual. That means each gifted child may need a chance and the four components to reach their potential into the talented stage. It is related to the gifted child's life and environment. (Gagné, 2008). See Figure 1.

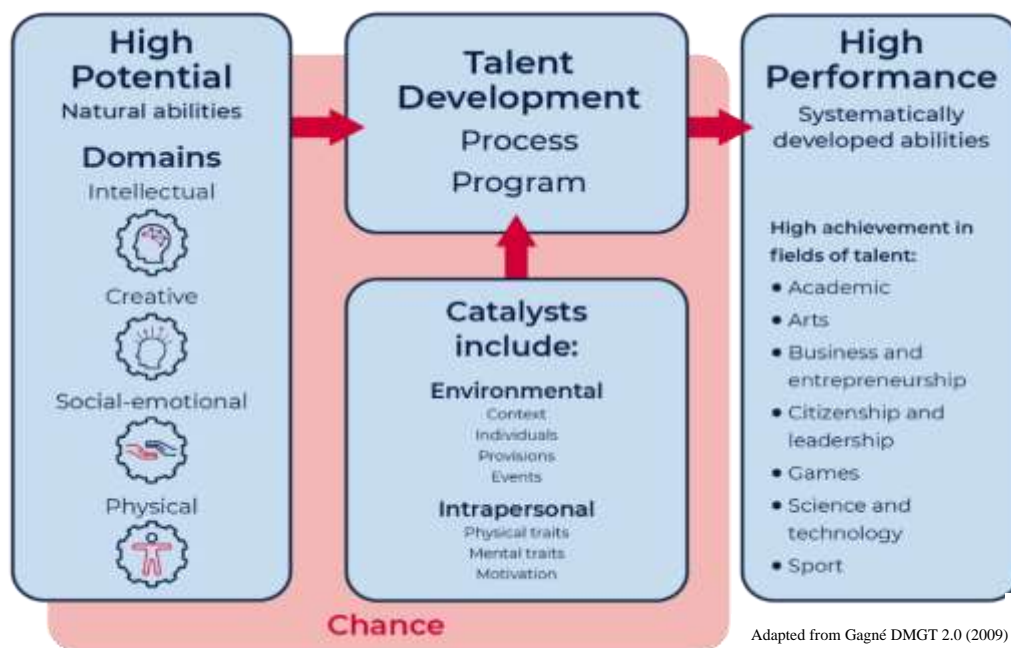


Figure 1: Gagné's DMGT Theory

As Gagné's theory highlights, gifted students need different forms of intervention programs to be able to fully achieve their potential. Therefore, this study aims to develop UAE grade 10 gifted students' creative problem-solving skills by directly teaching them creative problem-solving skills.

2.2 Literature Review

2.2.1 Definition and Characteristics of Gifted Students

It is so hard to explain about gifted education because it is compounded by problems with the definition. Giftedness itself has neither a narrow definition nor a single agreement as to its meaning. In addition to that, it is hard to agree on the definitions of intelligence, creativity and talent which are the components of giftedness, so it is not predictable to be able to agree on a definition of giftedness itself (Cramond, 2004). Identifying gifted and talented students has become a subject of great interest for

researchers, educators, administrators, and teachers. However, it is also an important issue because there is still no agreement on which factors must be considered to determine giftedness (Boran et al., 2015).

There are two types of definitions that are related to define gifted and talented students: unidimensional like Binet and Terman, and multidimensional like Gardner, Renzulli etc. (Manning, 2006). According to Binet, giftedness is defined as achieving high in IQ tests. Intelligence means a mental process that includes some kinds of activities. Mcclain and Pfeiffer (2012) said that giftedness is marked by efficient problem-solving, critical thinking, and effective abstract reasoning. On the other hand, there are some researchers that use more than one characteristic to define gifted students. For instance, Gardner suggests that there are eight types of intelligence and has also suggested the possible addition of a ninth known as existentialist intelligence (Cherry, 2018).

Calero et al. (2011) and Mcclain & Pfeiffer (2012) consider gifted and talented students as those who demonstrate a higher level of attaining significant achievements in culturally-valued domains. These authors consider a student's intellectual abilities, while also presenting the relatedness of certain personality traits and the role of stimulating social environments that can effectively favor an individual's learning in specific fields.

Other experts in the gifted field, such as Renzulli (2003) suggest that gifted behavior reflects an interaction among three basic clusters of human qualities. These clusters include the general and/or the specific ability of above-average ability (however it is not important that it be high); high levels of task commitment motivation; and high levels of creativity. He shows that gifted students are those that have or are able to

develop these compound groups of qualities and apply them to any potentially-valuable area of human performance.

Abraham Tannenbaum proposes a comprehensive definition of giftedness. His star model shows that gifted behavior is the culmination of five interacting factors: (1) superior general intellect, (2) distinctive special abilities, (3) specific personality attributes such as independence, intrinsic motivation, and flexibility, (4) a challenging and supportive environment, and (5) chance (Mcclain & Pfeiffer, 2012).

In addition to that, there is research similar to Gagné's focus on some factors that develop gifted into talented. Gagné 's DMGT describes three columns, with gifted and talented students, and catalysts that affect the developmental process, in the center. Gifted students move into talents through the developmental process. Gagné (2008) defines gifts as general and natural abilities, and talents as specific, more content-bound, and systematically-developed abilities. (Gagné, 2008).

In the UAE, there are also various definitions of giftedness. For example, as has been discussed earlier, the MOE defines giftedness as those showing outstanding ability, or a great deal of willingness, in one or more areas of intelligence, creativity, or academic achievement or special talents and abilities such as oratory, poetry, drawing, handicrafts, sports or drama.

Hamdan Bin Rashid Al Maktoum Foundation defines gifted students as those who have extraordinary abilities and/or who are performing more distinctly than their peers in mental abilities and/or academic achievement and/or leadership, which the community appreciates (Emirates Center for Strategic Studies and Research. (2016), p. 77).

According to (Yassin et al., 2012) there are many common characteristics for gifted and talented students such as unusual alertness; the ability to generate thoughts together quickly; good memory; having too much vocabulary and complex sentence structure for age; advanced understanding of word, imagination and abstract ideas; enjoying solving problems - especially with numbers and puzzles; often being independent learners in reading and writing skills; having deeper understanding, intense feelings, and emotions; being highly sensitive and thinking in abstract ways (Webb et al., 2007). In addition to that, they have their unique characteristics such as perfectionism, emotional intensity, and insistence on logic which can make it difficult for gifted students to 'fit in' with peers (Lu & Li, 2017).

The characteristics of gifted and talented students leads schools to care and put in place some specific programs for them. Also, researchers (e.g. Yassin et al., 2012) indicated that there are some special characteristics that make gifted and talented students unique and special. In the study of Yassin et al. in 2012, the researchers suggest that educators, including teachers, need to know and be aware of these variations, accept the differentiation between students and help to develop and improve students' abilities.

According to Yassin et al. (2012), there are two types of gifted students. The first type of student is musically and artistically inclined. This shows that academically-talented students can also be very much inclined towards music, art and drama at the same time. The second type of academically-talented student shows behavioral characteristics as expected and typical of gifted students' behavior: high in planning, motivation, learning, leadership, expressive language, and creativity.

2.2.2 Enrichment Program

Gifted students face difficulty in being matched with an appropriate class because they are cognitively ahead and they are socially younger than their age peers, which can result in behavior problems. If students with giftedness in music or in any subject matter don't receive any training for their talent, this may lead them to drop out school and have behavioral issues as reported by research (e.g. Hertzog & Beltchenko, 2007). According to Shoemaker (2016), there are some important reasons for gifted students to be bored in their classroom such as being under-challenged and disinterested. Gifted students need to be challenged. They need activities that will stimulate their brains and encourage them to go deeper into a subject. Therefore, gifted students need an enrichment program to meet their needs and care about their abilities. An enrichment program is any type of learning or activity which is outside the core of the learning which most students undertake (Council of Curriculum, Examinations and Assessment, 2006). It is more than the core curriculum. It is an extension too, not an alternative to the base of work being undertaken. In a well-planned and interesting classroom, it may already be available. It allows gifted and talented students to exchange ideas, thinking, and do creative projects in the classroom. Enrichment could involve a group of students working together. It may mean working in a different way from usual. It should enrich the base and widen it out (Council of Curriculum, Examinations and Assessment, 2006). Gifted students face difficulty in being matched to an appropriate class because they are cognitively ahead and they are socially younger than their age peers, which can result in behavior problems. Perfectionism and mastery drive - which is one characteristic of gifted students which makes them want to be perfect in all school activities that include their needs and interests - can

result in them exhibiting complicated, stress-related behavioral issues that are a challenge for all to solve. Therefore, they need a special enrichment program to reach their goals. Gifted and talented students may have an educational problem in the school because they understand well, and very fast, compared to their peers. There are many types of enrichment program that educators suggest all students take in their school such as school clubs, competitions, summer programs and after school enrichment programs. It is also recommended for students to have forms of problem-solving and creativity sessions for gifted and talented students (Christine, 2019).

There are many advantages of giving enrichment programs to gifted and talented students. It allows them to follow their study, have more understanding of the materials, and improve their information in the subject matter. This, in turn, will continue to improve their cognitive abilities, deepen their understanding of the public educational curricula and teach students to have self-dependence (AIDhaimat et al., 2020).

Other recent studies include the impact of enrichment programs including the positive effects of gifted enrichment programs. Such programs give gifted students the chance to create an amazing environment that promotes their learning needs. The enrichment program goals are to meet their needs and improve their creativity skills, and also to improve the quality of the students' experiences (Tan et al., 2020).

According to Ceylan (2020), the researcher did a summer enrichment program with a waste management theme for gifted students. The participants were 29 gifted students from grade five. The aims of the study were to know if the summer program prepared with the theme of waste management would have an impact on the environmental attitudes of fifth grade gifted students and, also, if the summer program prepared with

the theme of waste management would have an impact on the creative thinking skills of fifth grade gifted students; and, further, if the summer program prepared with the theme of waste management would have an impact on the critical thinking dispositions of fifth grade gifted students. The researcher used a pre - posttest. Their finding was that summer programs, which were done for gifted students outside the school environment, provide good attitudes and cognitive improvement of gifted/talented students. Also, it was shown that the enrichment program made a difference in posttest, on students' attitudes, creative thinking and critical thinking skills (Ceylan, 2020).

Also, the School Enrichment Model (SEM) which was done by Sally M Reis and Pamela M Peter talked about the positive affect of the SEM for gifted students. The participants were from diverse populations including twice-exceptional and underachievers and gifted students. SEM includes many activities such as creative and critical thinking skills. Their finding was that SEM, in general, may help all students - including gifted students - and it was recommended to apply it widely so that it leads to positive results for academically-talented and highly able students. In addition to that, applying a schoolwide enrichment model gives chances for gifted students to be challenged, keep their points of strength and provides opportunities. (Reis & Peter, 2020).

There are two approaches to teach thinking skills, the implicit approach and the explicit approach. In a thinking program, the term direct or explicit instruction refers to the educational approach of giving direct instructions to students and that are structured and guided by teachers. In addition, it means that the teachers are the 'guidance' in the instructional methods or are giving the rules in a manner that is

‘directed’ to the students (Lombardi, 2020). Explicit thinking method refers to something that is very clear and not ambiguous. It means giving the instructions direct to the students.

Implicit thinking method often takes the opposite approach, including something that is understood, but not represented in a direct way, and always uses assumption. Explicit thinking is explained - implicit thinking skills are implied (An Explication on the Use of “Explicit” and “Implicit, 2019). Implicit instruction or method is represented in teaching where the teacher or educator does not give goals or explanations to the students, but presents the information or problem to the student and gives them the chance to make their own concept and create their own thinking - it is an indirect method of teaching. (Smith, 2017).

The example of explicit thinking or using this method is giving instructions to students on how they record answers. In implementing the strategies in schools, it may include both implicit and explicit critical thinking activities in the lessons. Implicit activities are the questions that are very related and directed in any exercise and not separated from the ‘critical thinking’. Explicit thinking activities always give instruction directly to students to achieve the goals and effectiveness of reaching the outcomes. In implementing strategies in schools, both implicit and explicit critical thinking activities may be implemented in lessons. Implicit activities are the questions that are very related and directed in any exercise and not separated from the ‘critical thinking’. Explicit thinking activities always include more than one exercise and openly direct students to represent more and achieve the goals and effectiveness of reaching the outcomes. Implicit critical thinking activities take more time than explicit ones. When a teacher encouraged thinking on language used in an error assessment session, for

example, the teacher gave a sentence to students saying "the student did a great job" and let the students provide their opinions and think about their peers' work. In this scenario the students form their own hypothesis about their peers and sometimes the teacher faces the issue that the students did not understand the questions. Explicit critical thinking tasks show most in receptive skills lessons where students are having to examine the main comprehension of a text. An example of explicit critical thinking is asking students to evaluate or assess the main purpose of the given text. Explicit critical thinking is better than implicit because it gives a direct instruction to the students, which leads them to understand step-by-step, and guides them in their studies. (Lee, 2018). In fact, many educational psychologists argue that thinking skills are important aspects in education (Sternberg, 2015). Sun-Youn and Jiwon (2020) conducted research about giving instructions to students by a direct way which is the explicit approach. The aim of the study was to investigate the role of explicit writing instruction in a writing class from the perspective of a process-genre approach to teaching. The participants were 15 students who participated in this study. The results showed that the explicit instruction approach helped to improve students' writing skills (Sun-Youn & Jiwon, 2020).

2.2.3 Impact of Enrichment Programs on Enhancing Gifted Learners' Creative and Problem-Solving Abilities

Teaching problem-solving skills is very important for gifted and talented students. Problem-solving is defined as the processes and method that is used to get a best answer to an unknown problem, or in decision-making. Gifted students need to know about problem solving strategies. According to Uçar et al. (2017), the feature that differentiates a gifted student from their peer is problem-solving skills. Also, Kim (2016) indicated that giftedness and effective problem-solving skills are positively

related to each other. However, gifted students lack higher-order thinking skills, therefore, school needs to teach them these skills directly.

Problem-solving strategy is one of the most effective ways to teach gifted students. It is different than other strategies; it allows gifted students to think and imagine which makes the student consider issues and problems - and future solutions for them. According to Maker et al. (2015), the use of the Real Engagement in Active Problem Solving (REAPS) in the classroom among students can help gifted students to take part in activities and collaborated with their peers through experimenting with a series of steps in problem-solving.

Creative Problem Solving (CPS) is a very important model in teaching and learning. Some researchers - "Mare van Hooijdonka, Tim Mainharda, Evelyn H. Kroesbergenb & Jan van Tartwijk, etc" said that educational and everyday life needs to produce creative problem solvers that understand everyday problems, generate multiple creative ideas and select the best creative ideas for the problem. In addition to that, CPS contains three important components including understanding the problem, suggesting and generating ideas and preparing to find the solution (Puccio et al., 2018).

Creative instruction promotes creative thinking and problem-solving (Treffinger, 2009) and it enhances motivation and collaboration between students. Creative thinking and problem-solving skills build on critical and creative thinking and go from the simplest way of thinking about 'what if' to engaging in real-life problem-solving. Problem-solving skills and creativity enhance students' abilities to use both divergent and convergent thinking. As Reiter-Palmon (2018) said "Creativity is not only about generating ideas, it involves making changes and thinking outside the box". Also, creative problem-solving involves focusing on the first ideas and examining and

changing them into new and unique ideas (Drapeau, 2014). Creative problem-solving is not only related to brainstorming, it is a process or method that can assist students to define a problem and implement solutions within steps.

According to Jeffrey Baumgartner creative ideas do not suddenly come from students. Students make many efforts and come up with conclusions by trying to solve a problem or achieve a special goal. For example, Albert Einstein's theory did not come suddenly from his inspiration alone. It was the conclusion of a large amount of mind problem-solving trying to close a confliction between the laws of physics and the laws of electromagnetism (Baumgartner, 2010).

The application of a future problem-solving program leads students to develop their creative performances (Henwood et al., 2015). The Future Problem-Solving Program (FPSP), which was examined by researchers in Saudi Arabia with gifted and talented students, led to some effective results including that gifted students had a curiosity to learn the creative thinking skills related to the FPSP. Findings of this study showed that this kind of program led gifted students to have more self-learning, improve ways of thinking, promote motivation and positive attitudes towards learning, increase effectiveness and dealing with technology and resulted in creating a more interesting learning environment in and achievement of continuous learning. This result suggests that educators may need to use problem-solving strategy and enrichment units to enhance gifted and talented students' thinking skills (AlDhaimat et al., 2020). Different studies indicated that problem-solving training processes increases creative thinking by inducing active engagement in problem identification and construction (Reiter-Palmon & Robinson, 2009).

According to Smedsrud (2018), one of the most important and useful strategies to teach gifted and talented students is problem solving. In order to be able to solve the problem, gifted students may need to know about problem-solving steps and how to solve problems effectively. In addition to that, problem-solving strategy is effective for gifted students. It goes through many steps starting from defining the problem, using many resources, finding different solutions, choosing one of the best solutions. This study was very effective for gifted students because the researcher used online students' feedback to know the students' overview about problem-solving strategy that can raise their understanding of problem-solving strategies (Pratiwi et al., 2018).

Creativity is not new to gifted students. They come to school with a life history of creativity, whether it is proved by using the internet or different extra activities. So, administrators and teachers need to encourage creativity in their schools. However, they do have to explore the methods by which they may increase creative activities in the mission of their educational institutions. (Livingston, 2010).

Also, creative skills are required by many companies and institutions today, but teachers or gifted coordinators have a lack of knowledge about helping gifted students in their development and improving their abilities (Daly et al., 2016). Creativity is also important in improving problem-solving strategy and other cognitive abilities, and healthy social and emotional well-being (Forgeard & Elstein, 2014). The Creative Problem-Solving program was proven effective in some countries. Vahid and others said that the problem-solving program had an impact on gifted and talented students; they said that in their research, they used a creativity checklist in the posttest stage of the experimental group and found that creativity significantly increased compared to

students in the control group. And a creative interpersonal problem-solving program improved creative thinking in gifted high school students (Kashani-Vahid et al., 2017).

Teaching creativity skills using SCAMPER is very important. This strategy was found to be effective according to research. In a study that examined the effect of the SCAMPER program on creative thinking of gifted students at the King Abdullah Schools for Excellence (KASE) in Jordan, researchers indicated that the SCAMPER strategy is effective. The researcher used an experimental group and a control group. The participants numbered 21 in each group. The researcher used a Torrance Test of Creative Thinking (TTCT) to evaluate the students' creative thinking. The results showed that there is a significant effect of the SCAMPER program on creative thinking as measured by TTCT which led to the conclusion of the effectiveness of using this strategy with gifted and talented students. Also, this research recommended educators create a thinking program and activities to enhance gifted students (Khawaldeh & Ali, 2016).

In another Korean study which was about enrichment programs for nurturing creativity of the Korean Gifted, conducted by Kim et al. in 2004. The author mentioned that the goal of nurturing creativity was for the gifted who were expected to solve unprecedented problems in the future. Enrichment programs were very useful and related to the creative problem-solving ability which was identified as an ability to produce new and useful ideas or solutions through dynamic interactions between stimulation, knowledge, and skills. After the application of this program, they found that gifted students enjoyed the enrichment programs and wanted to continue to take part in the program if possible (Kim et al., 2004).

Other research took place in Turkey for gifted and talented students. The participants of this study were 13 gifted students from grade three and five. In this study, students were informed about the problem-solving steps and they were asked to do a project that include problems with their solutions. After the intervention and presenting students' creative projects, results of this study revealed that gifted students have more awareness in creative problem-solving strategy. The study suggests having some creative activities for gifted and talented students. Creative activities can enhance and improve the creativity with gifted students in many aspects of their lives (Karademir, 2016). In addition to that, in a study that examined the impact of brainstorming in enhancing students' creative thinking skills, the creative strategy that was used with the experimental group makes a significant improvement in the students' creative thinking skills. The researcher suggested the use of this strategy in universities (AlKhatib, 2012).

Another study took place in Sudan. This study examined the effectiveness of using both traditional approaches and problem-solving to improve writing skills for cycle three students. This study aimed to identify the effectiveness of using problem-solving strategies. The participants in this study were 92 male and female students from two schools. The study shows that before providing problem-solving strategy to the students, the students could not know the problem-solving steps. After applying the program, the students were able to know the steps. Also, this study affirms the effectiveness of problem-solving strategy in developing creative writing skills. Finally, the study recommended further studies and research on the problem-solving strategy and its role in education (Abdullah, 2019).

In addition to that, there is research (Birgili, 2015) that focuses on enhancing creativity and problem-based solving among gifted and talented students. It shows that there are some criteria to let students be inventors and think outside the box to solve their real-life problems by creative thinking. Also, it was found that these skills - such as thinking skills and creativity - are very important to gifted and talented students and they are required for sustainability and continuing education (Birgili, 2015).

2.3 Summary

Literature (e.g. Tan et al., 2020) indicates that there are many advantages of enrichment programs such as allowing gifted students to follow their study, having more understanding of the materials, improving their information in the subject matter, improving their cognitive abilities, deepening their understanding of the public educational curricula and teaching students to have self-dependence, increasing their motivation and thinking skills.

Caring about gifted students is very important. Gifted students are the future innovators: they will create new and unique ideas. Offering enrichment programs will give gifted students the opportunities to participate in country improvement and wealth. Also, gifted students could build the future according to life changes.

Researchers have largely focused on enrichment programs and the effect of it in the gifted students' progress (AlKhatib, 2012). The enrichment program which was covered in the literature review addressed what is found to be the positive impact of the program. Although several researchers in gifted education (e.g., Cetinkaya et al., 2015; Maker, 2020; VanTassel-Baska, 2020; Renzulli, 2020) reported that the effect of enrichment creative and/or problem-solving programs was effective in developing

gifted students' creative problem-solving skills, there is no known research that has examined the impact of the enrichment program for high school gifted students in the UAE. This study is an opportunity to fill the gap that exists today regarding what is the impact of the enrichment among grade 10 gifted students. The goal of this study was to examine the impact of an enrichment program on improving UAE high school gifted students' creative problem-solving skills.

Chapter 3: Methodology

3.1 Introduction

This study aims to examine the impact of an enrichment program on improving UAE high school gifted students' creative problem-solving skills. More specifically the research questions of this study are as follows:

1. Are there any statistical differences between the control group (which did not receive the enrichment program) and the experimental group (which received the enrichment program) in the SCAMPER post-test?
2. Does the enrichment program significantly improve the creative problem-solving skills of UAE gifted high school students?
3. Are there any statistically-significant differences between the control group's (which did not receive the enrichment program) and the experimental group's (which received the enrichment program) awareness of problem-solving steps before and after the implementation of the enrichment program?
4. Does the enrichment program significantly improve the awareness of the problem-solving steps of UAE gifted high school students?

This chapter presents the methodological procedures used to find answers to the research questions that guided the study. This section includes the research design, a description of the participants, instrumentation, data collection methods, validity and reliability of the instruments, data analysis techniques, and ethical considerations.

3.2 Participants

To answer the four research questions, a convenient sample of a total of 57 gifted students from Abu Dhabi schools was selected. The researcher also used the purposive sampling technique in the selection of the schools. The selection of the two public schools was based on the following criteria: a) the schools have the score 'A' in the evaluation administered by Abu Dhabi Department of Education and Knowledge (ADEK), b) the schools have grade 10 gifted students; and c) the schools are located in the Emirate of Abu Dhabi. Also, the researcher selected participants who were identified as gifted students by ADEK schools. And lastly, the participating students must be gifted students enrolled in an MOE school.

According to ADEK, the number of total gifted students is 700 students in the Emirates of Abu Dhabi schools including government schools. Fifty-seven students participated in this research. So, the representation of the sample in this study is 8% of all gifted students in the Emirate of Abu Dhabi.

As Table 1 shows, all participants are females in grade 10 advanced class. The participants were between 14 to 16 years of age at the time of the study. With regard to nationality, most of the participants were non-Emirati nationals (67%) and the Emirati students represent 33% of the sample. Figure 2 shows the percentage of Emirati and non-Emirati participants, and Figure 3 shows participants by average age and grade.

Table 1: Participants data

Students	Emirate Students	Non-Emirate Students	Average ages	The Grade	School District
Control Group	16	11	14-16 years old	10 Advanced	Abu Dhabi
Experimental Group	8	22	14-16 years old	10 Advanced	Abu Dhabi

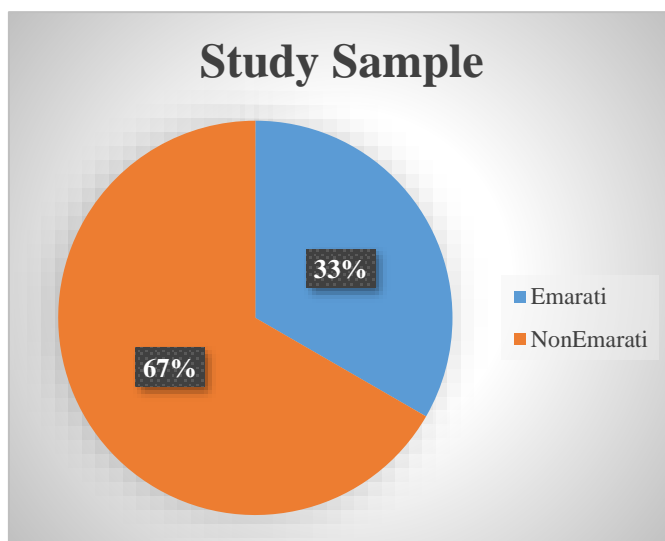


Figure 2: Participants – Emirati and Non-Emirati

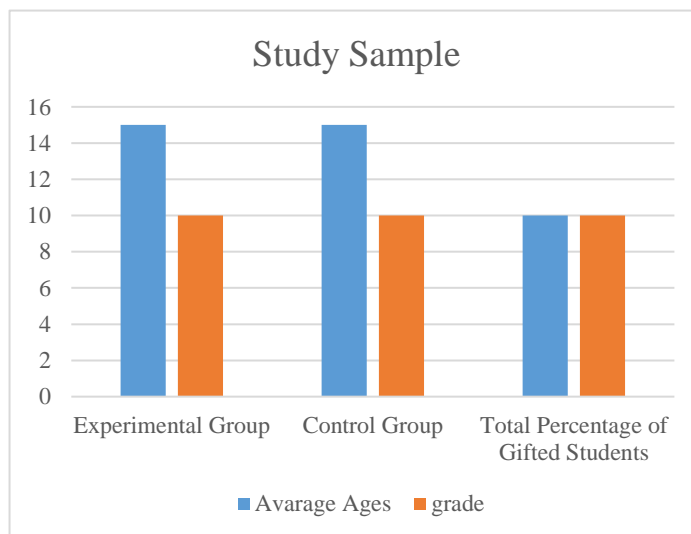


Figure 3: Participants by Average Age and Grade

3.3 Instruments

To answer the research questions, the researcher developed a Problem-Solving Questionnaire (PSQ) to assess the students' awareness of problem-solving steps. To develop the PSQ, first the researcher reviewed the literature reviews in relation to problem-solving skills (e.g. Drapeau, 2014; AlKhatib, 2012; Henwood et al., 2015) and then the researcher prepared a checklist about problem-solving steps according to the previous studies. Due to the nature of the study, the researcher developed another instrument entitled "SCAMPER Test" to collect the data in relation to the students' creative problem-solving abilities. More specifically, the instruments are as follows:

- A) Problem Solving Questionnaire (PSQ): This questionnaire includes 14 items on problem-solving steps (see Appendix A), which was developed to examine the students' awareness of problem-solving steps. It was applied before and after the enrichment unit. This questionnaire has a scale ranging from 1-3. More specifically, the responses ranges from 1 = Never, 2 = Sometimes to 3 = Always.
- B) SCAMPER Test: The researcher reviewed Torrance creative thinking activities (Elif, 2016) to develop this test. Then the researcher developed the SCAMPER test by combining the Torrance activities with the problem-solving steps (See Appendix C). The test includes three groups of items that include a creative problem-solving skills. SCAMPER test instrument includes three groups of items, and the student will choose one item from each group to create a new and creative item (see Appendix B). Group A items include Toothbrush, Refrigerator, Digital camera, Fire alarm, Mobile radio, Bed, Vacuum cleaner, Wood-burning fireplace, Guitar, Baking machine, White paper, Book, Cup, Basket and Dining table. Group B items include Office, Pen, Knife, Sewing

machine, Car, Thermometer, Electric phone charger, Magic Mirror, A box of napkins, Flower Vase, Key, and Door. Group C items include Chair, Hat, TV, Column, Lamp, Cup, Watch, Pencil, sharpener, Vacuum cleaner, Computer, Bicycle, and Mobile phone. The student must take three items and merge them together and develop a new product; then they must write a name of the new product that they been created. SCAMPER technique includes seven components including Substitute, Combine, Adapt, Modify, Put to another use, Eliminate and Reverse. Substitute means find the information of the idea, product, service, or methods etc. Combine means put several ideas, methods, or products into one more effective output. Adapt means make a change to have a different idea that could help to solve a problem. Modify means modify any part of the problem or situations, so it could give a new ideas or new values. Put to another use is putting an exciting concept to another use, it means using this tool in different ways. The last one is Reverse which means doing things the other way around, completely opposite to the original purpose (Linh, 2016). The researcher developed the instrument by reviewing relevant literature. The SCAMPER test has 7 prompts to consider to aid product improvement. It has a scale ranging from 3 to 10. The responses range from 10 = High Score “Excellent” - 5 = Middle Score - 3 = low Score “Acceptable”. The aim of the SCAMPER test is to examine the students’ abilities in creative problem-solving by asking students to create a new product, and through this test, the student will follow problem-solving steps to reach a new product. The SCAMPER test includes seven steps starting from Step 1: - The step of selecting three items to reach a new product, including the first step which was to identify the problem. The second step was collecting information related to the problem: - In this step,

the student was to collect information about the product or item to be integrated with the other element, i.e. the student can collect information about the three elements that will be merged together. The third step was to generate a lot of ideas for these three items and what they can eventually produce. The fourth step was to find the best idea among the ideas presented for these elements, and through this step the student can choose the best product among the products previously displayed. The final step was to produce the final product, which was the solution to the problem presented, and in this step the product must have a real value of meaning and use in everyday life.

3.4 Intervention Program

3.4.1 The Aim of the Program

The aim of the program was to increase gifted high school students' awareness of problem-solving steps and to increase their creative problem-solving skills using SCAMPER and direct instruction strategies.

3.4.2 The Content of the Program

The program consists of one unit including 15 lessons. Each lesson takes about 45 minutes and it contains a number of activities. For example, Power point presentations about problem solving steps, SCAMPER worksheets, group work, discussion and brainstorming (See Appendix D). It also includes some kinds of activities such as thinking skills activities created by educationalists Torrance and Debono. In addition to that, the researcher used videos to explain about problem-solving steps and SCAMPER strategy. Also, the program intends to enhance the students' research skills as well.

3.4.3 The Development of the Program

To develop the program, first the researcher reviewed the literature reviews in relation to creativity and problem-solving skills (e.g. Drapeau, 2014; AlKhatib, 2012; Henwood et al., 2015) then, the researcher reviewed many problem-solving models e.g. (PBL, SEM, REAPS). Also, the researcher used a SCAMPER strategy (Khawaldeh & Ali, 2016). SCAMPER strategy is supported by the research in developing creative problem-solving skills. That is why the researcher used it as well as to enhance gifted students' awareness of the problem-solving steps and their creative problem-solving skills.

To enhance the students' awareness about the problem-solving steps, the researcher prepared five lesson plans to be delivered within a two-month period. Each lesson plan focuses on one step of problem-solving. The researcher trained the students in the SCAMPER strategy in the last two weeks of the program. SCAMPER includes seven steps, including Substitute, Combine, Adapt, Modify, Put to another use, Eliminate and Reverse. Substitute means find information about the idea, product, service or methods etc. Combine means put several ideas, methods, or products into one more effective output. Adapt means make a change to have a different idea that could help to solve a problem. Modify means modify any part of the problem or situation, so it could give a new ideas or new values. Put to another use is putting an exciting concept to another, it means using this tool in different ways. The last one is reverse, which means doing things the other way around, completely opposite to the original purpose (Linh, 2016).

Another strategy was a direct instruction. The researcher used a direct instruction to teach problem-solving steps. Direct instruction was very effective as it has been

reported in research (e.g. Sun-Youn & Jiwon, 2020). The implementation of the program was within two months.

3.4.4 The Implementation of the Program

The program was implemented in 2020-2021 from August until October. The implementation of the program was based on using SCAMPER strategies and direct instruction and it includes five steps. First, the researcher administered a pre-test, which included the problem-solving questionnaire and the SCAMPER test to assess the creative problem-solving skills and the awareness of problem-solving steps within gifted students. The researcher assesses the students by giving them a slide of PowerPoint presentation including the pictures of the three groups of items and asks them to choose one item from each group. (See Appendix C). The SCAMPER test includes seven steps starting from Step 1: - The step of selecting three items to reach a new product, including the first step which was to identify the problem. The second step was collecting information related to the problem: - In this step, the student was to collect information about the product or item to be integrated with the other element, i.e. the student can collect information about the three elements that will be merged together. The third step was to generate a lot of ideas for these three items and what they can eventually produce. The fourth step was to find the best idea among the ideas presented for these elements, and through this step the student can choose the best product among the products previously displayed. The final step was to produce the final product, which was the solution to the problem presented, and in this step the product must have a real value of meaning and use in everyday life. Group A items include Toothbrush, Refrigerator, Digital camera, Fire alarm, Mobile radio, Bed, Vacuum cleaner, Wood-burning fireplace, Guitar, Baking machine, White paper,

Book, Cup, Basket and Dining table. Group B items include Office, Pen, Knife, Sewing machine, Car, Thermometer, Electric phone charger, Magic Mirror, A box of napkins, Vase, Key, and Door. Group C include Chair, Hat, TV, Column, Lamp, Cup, Watch, Pencil, sharpener, Vacuum cleaner, Computer, Bicycle, and Mobile phone. The student must take three items and merge them together, then they must write a name of the new product that they have created.

Secondly, the researcher and facilitators started to implement the program. The facilitators help the researcher to communicate with the students while the researcher taught directly the students problem-solving steps using SCAMPER strategy. Facilitators means the teachers who were with the researcher to assist in applying the program. They were the government teachers who already have experience to teach gifted students and they were gifted coordinators in their schools. According to research, teaching thinking skills directly is an effective strategy (Nugroho et al., 2020). Direct instruction means the giving of direct instructions to the students so that they are structured and guided by teachers. Also, it means that the teachers are providing “guidance” in the instructional methods or giving the rules in a “directed” manner for the students (Lombardi, 2020). Sun-Youn and Jiwon (2020) found that teaching students in a direct way is very effective and important. Their results include that explicit instruction approach helped to improve students’ writing skills. Applying the program was over five weeks including the lesson plans. The lesson plan for first week contains the first step of problem-solving which was identifying the problem, with some activities such as mind games and educational online programs e.g. "Nearpod, Padlet and Forms". Week two includes teaching students the second steps of problem-solving which was brainstorming solutions. The third week contains a third step which was picking and implementing a solution. The final week includes

the SCAMPER strategy to promote problem-solving steps with all discussion and activities that are done with the students.

The third step of the implementation of the program lies on the implementation of the program by applying SCAMPER strategy and teach it directly.

In the fourth step, the researcher and her facilitators check the students' understanding of problem-solving steps by doing some assessment methods (See Appendix F). The fifth or the final step include the administration of the posttest to examine the impact of the enrichment program on gifted students' creative problem-solving abilities and the participants' awareness level of problem-solving steps (See Appendix A).

3.5 Instrument Validity

The researcher must confirm the validity of research instruments used in the study and review the content validity of an instrument. Kahveci and Atalay (2015) shows that the researcher may ask a group of specialists in the field to see the instrument and give their feedback and agreement of it. Following these suggestions, the researcher established the validity of the questionnaire by asking specialists in gifted education to review it. The panel comprised of three members from the College of Education and one specialist in the field of innovations and creativity from the MOE. The researcher took feedback from the specialists and examined it in order to make the necessary modifications to the original questionnaire. The specialists recommended some important amendments to the original checklist including: putting the questionnaire rating scale, rewriting some of the items to make the sentence simple, deleting some items that were not connected to the research purpose of the study and merging some of the items together. Later, the modified version was given to the two

Arabic teachers to double check the clarity of the language used in the checklist items. Finally, the researcher reviewed the checklist items again to be sure of the accuracy and language. The validity of the SCAMPER Test was also determined by asking three specialists from College of Education faculty members to review it. A test was revised according to the specialists' judgment. The researcher considered all the experts' comments. One of the most important revisions was deleting one of the items as it was not related to creativity.

To establish the content validity of the program, the researcher gave the lesson plans to the three specialists in gifted areas to judge it. The specialists wrote some comments for the researcher, so the researcher could modify the lesson plans according to the specialist comments. One of the important comments was to create a challenge assessment activity after each lesson to challenge gifted students. The researcher did that and started to implement the enrichment program for gifted students.

3.6 Reliability Analysis Results

Computing the item-to-total correlation and also a coefficient alpha using the SPSS package constitutes the reliability analysis process. Item-to-total correlation and the Cronbach's Alpha coefficient are considered to be very popular rather than a cross – item reliability index in the field of social science research. As it is shown below in Table 2, the reliability of the Problem-Solving Questionnaire was high (0.847).

Table 2: Reliability analysis item

Item Code	paragraphs	Item-Total Correlation
	Cronbach's Alpha for General level	0.847

In this research, the researcher used a T-Test to assess the students' problem-solving awareness level between the two groups (see Table 3). Table 3 shows the independent samples T-test results for testing the difference between average awareness levels of the control and the experimental groups before applying the SCAMPER teaching technique. Table 3 shows that there is no significant difference between the experimental and the control groups' average awareness levels of problem-solving steps before the application of the teaching technique since the p-value (0.935) is much larger than the significance level of the study (0.05), which may indicate that the two groups have similar problem-solving capabilities.

Table 3: Independent samples T-Test of the statistical differences between the means of the control group and experimental group in problem solving questionnaire

Group	N	Mean	Std. Deviation	T	Sig.
Control	27	2.38	0.33	0.083	0.935
Experimental	30	2.39	0.32		

Based on the previous results, the researcher can apply the test of an enrichment program, on UAE high school gifted students' creative problem-solving skills for the experimental group.

3.7 The Pilot Study

Piloting the research instruments is a very important step to improve the research instruments (Marumo, 2018). A pilot study was conducted using 15 gifted students enrolled in Abu Dhabi government secondary schools. The purpose of the pilot study was to determine whether the PSQ used was straightforward and clear with no ambiguity.

To pilot the questionnaire, the researcher administered the questionnaire to the gifted students. The participants included 15 gifted students from a governmental school. The researcher gave the problem-solving checklist to them in Term 1 in the academic year 2020 using Microsoft Teams program. That is because all UAE systems were using distance learning at this period of time due to Covid 19. The participants completed the checklist of the problem-solving steps in the Teams program in September 2020-2021 in the first trimester for the students, and then informed the researcher whether they found the checklist items clear or confusing. Based on the participants' comments in the pilot study, the researcher made some revisions including changing some words. Results of the pilot study indicated that the instrument was straightforward and clear with no ambiguity.

3.8 Research Design

The research design that was used in this study is a pre-posttest quasi-experimental design. A quantitative approach was used in this study. According to Carroll and Squires (2020), a quantitative approach is a good method to collect data and they encourage researchers to use quantitative data because quantifying methods have special features and it creates big numerical databases that can be useful and easy to use in statistical analysis (Carroll & Squires, 2020). Pre-test and post-test design are used to assess the participants' awareness of problem-solving steps and creative problem-solving skills. Also, it is used to assess applying the information presented in the training or with creating a new concept (Stratton, 2019). Since this study aimed to examine the implementation of an impact of an enrichment program on improving UAE high school gifted students' creative problem-solving skills the researcher used pre-posttest design.

3.9 Data Collection/Procedure

The data collection procedures included two phases. In the first phase the researcher chose two schools randomly from secondary government schools in Abu Dhabi, which meet the researcher's criteria of school selections. Then the researcher made a formal request to the Ministry of Education in the first semester of academic year 2020-2021 to contact the five schools and teachers in order to initiate the data collection process. This request along with a brief description of the study, a copy of the questionnaire, and other official documents was sent to the Ministry of Education (MOE) via their official emails. The researcher followed up with the research department at the MOE and provided them with all the documents they requested by email. The documents that the ministry required included the literature review that the researcher would use in her study, filling some basic information such as personal information, the study title and the study "objectives", data collections tools, and the expected findings of the research; and also the whole proposal of the research.

After obtaining the Ministry approval letter (See Appendix F), the MOE members in the school operations department sent a formal email to the five target schools. The researcher selected the government secondary schools, as indicated before, on the basis of their having obtained an A grade in the Irtiqaa assessment and having gifted students. Out of the five, two schools agreed to be a part of the research. The lessons were chosen according to the school schedule time and preparation was done according to the time that was suitable to the researcher to implement the intervention program. Then the researcher sent a hard copy of the questionnaire and asked the MOE to send it to the schools via formal emails. Also, the purpose of the study was explained in the emails and it was included in the consent form. The schools added the

researcher to their Teams program channel and let the researcher enter their students' class in specific time periods twice a week. The researcher gave the participants a consent form to be sure they have agreed to participate in this program. The first phase of the data collection procedure took about one week as the questionnaire was given to the participants via Teams program during these circumstances by the teachers. During the data collection procedure, the researcher followed up with the MOE by formal email.

The data collection of the study includes a pre and post questionnaire for problem solving and the SCAMPER test. The program that was applied with the participating gifted students included many activities during the lessons such as mind activities, brainstorming, and discussions. The duration of the intervention program was five weeks as the researcher said in the above section.

Before applying the program, the researcher collected the data in pre-test during the program from the control and experimental groups. The students or participants were randomly grouped into the two groups (control vs. experimental), 30 students in the experimental group and 27 students in the control group. To be able to implement the program, the researcher contacted two teachers who have an expert certificate in gifted strategies; those teachers were from the UAE. Their ages were between 28 and 30. They were gifted coordinators in their schools. These teachers help the researcher to communicate with the students while the researcher taught the students problem-solving steps using SCAMPER strategy; then the researcher collected the assessment data for each step of problem-solving after each lesson via many programs such as PADLET, FORMS, PowerPoint and Nearpod programs. At the end of the program, the researcher gave the same questionnaire to a group of gifted students to compare

the impact of the enrichment program for those gifted students. The researcher administered the instruments to the two groups at the beginning and at the end of the program including experimental and control groups.

3.10 Ethical Considerations

Ethical principles were included in the study. For this research, there was an informed consent letter given to the participants and their parents (See Appendix G). It showed the aim of the study and let the participants know and be sure that their confidentiality would be respected. To further ensure confidentiality, the researcher let the participants write a letter instead of their names to hide their true identity. Participants were told that no one other than the researcher had access to the data retrieved from the two instruments. The participants who completed the two instruments for this study were aware that their participation in the study was voluntary. The opening statements of the questionnaire showed the purpose of the questionnaire and highlighted its importance to the study. The researcher made sure that the participants' personal information such as their names remained confidential.

3.11 Data Analysis

Since the data for the study was gathered using a quantitative approach (The Problem-Solving Steps checklist and the SCAMPER test), a quantitative analysis (Mean, Standard Deviation, T-Test and Eta) was used to find the answers to the research questions posed in this study. The researcher used the SPSS program to analyze the data.

Chapter 4: Results of the Study

This chapter presents the data analysis and reports the research findings. This study aimed to examine the impact of an enrichment program on UAE high school gifted students' creative problem-solving skills and awareness of problem-solving steps. The researcher studied a sample of 57 students (30 experimental group & 27 control group). The data analysis for each research question will be discussed separately in the following section.

1. Are there any statistical differences between the experimental group (which received the enrichment program) and control group (which did not receive the enrichment program) in the SCAMPER post-test?

To answer the first question the means and standard deviations of the SCAMPER post-test were analyzed for both the experimental and control groups using the independent samples T-test to check the statistical significance of differences at $\alpha=0.05$ between the means of the control group and experimental group in the post-test. As it is shown in Table 4 - the results of the t-test that compare the means of SCAMPER post-test of the control group and the experimental group at .05 level of significance - there is strong evidence to conclude that there is a statistically-significant difference between the results of the control group and the experimental group on the SCAMPER post-test. Looking more closely at the mean of the control and experimental groups, it is found that the experimental group scored significantly higher ($m=52.30$) than the control group ($m= 31.26$). According to these results, the enrichment program using SCAMPER strategy was found to have a significant positive effect on the students' creative problem-solving skills among UAE high school students.

Table 4: Independent samples T-test of the statistical differences between the means of the control group and experimental group in SCAMPER post-test

Group	N	Mean	Std. Deviation	T	Sig.
Control	27	31.26	11.87	7.695	0.000
Experimental	30	52.30	8.23		

2. Does the enrichment program significantly improve the creative problem-solving skills of UAE gifted high school students?

A proper answer to this question can be obtained by comparing the means of the pre-test and post-test for the experimental group using paired samples T-test to check the statistical significance of the differences at 0.05 level of significance. Table 5 below shows the paired T-test results for testing the difference between the means of the pre and post-tests results for the experimental group. Table 5 reveals that there are statistically-significant differences between the means of the pre-test and post-test for the experimental group at the 0.01 significance level, as the significance level was lower than 0.01 significance level. In looking at the mean of the experimental groups more closely in the pre and post-tests, it is found that the experimental group scored significantly higher in the post-test (m=52.30) than in the pretest (m= 42.07). These findings indicate that there is an improvement in the experimental group students' creative problem-solving skills over time which confirms the positive impact of the enrichment program using the SCAMPER strategy.

Table 5: Paired samples test of the statistical differences between the means of pre-t and post-test of the experimental group using SCAMPER test

Application	N	Mean	Std. Deviation	T	df	Sig.
pre-test	30	42.07	13.31	4.592	29	0.000
post-test	30	52.30	8.23			

To examine the effect of the use of the enrichment unit on UAE high school gifted students' creative problem-solving skills the Eta squared statistic was calculated using the following equation: $\text{Eta Squared } (\eta^2) = \text{size of the effect} = \frac{t^2}{t^2 + df}$. Table 6 below shows the Eta squared value (the effect of the enrichment unit). Table 6 shows that the enrichment program effect is associated with 18% of the variation of the students' post-test results. This result shows the significant impact of using this strategy in the enhancing UAE high school gifted students' creative problem-solving skills.

Table 6: Eta squared (η^2), and size of the effect for an enrichment unit on problem-solving and creativity skills

Independent	dependent	Eta	Eta Squared
Enrichment unit	Creative Problem Solving Skills	0.426	0.181

- Are there any statistically-significant differences between the control group's (which did not receive the enrichment program) and the experimental group's (which received the enrichment program) awareness of problem-solving steps before and after the implementation of the enrichment program?

To answer this question, the researcher had used the independent samples T test to assess the significance of the differences between the average awareness levels of

the control and the experimental groups before and after applying the enrichment program using the PSQ.

Table 7: Independent samples T-test of the statistical differences between the means of the control group and experimental group in problem solving questionnaire post-test

Group	N	Mean	Std. Deviation	T	Sig.
Control	27	2.32	0.36	5.988	0.000
Experimental	30	2.82	0.27		

Table 7 presents the independent samples T-test results for testing the difference between average awareness levels of the control and the experimental groups after applying the SCAMPER strategy. Table 7 shows that there is a highly significant statistical difference between average the awareness levels of the experimental group and the control group of problem-solving steps after the application of the teaching enrichment program using SCAMPER strategy, since the p-value (0.000) is much lower than the significance level of the study (0.05). The test results show that the experimental group is on average, significantly more aware of problem-solving steps after the application of SCAMPER strategy when compared to the control group, which indicates the effectiveness of the SCAMPER strategy.

4. Does the enrichment program significantly improve the awareness of problem-solving steps of UAE gifted high school students?

To answer this question, the paired samples T-test was used to compare the difference between the awareness level of the experimental group before and after applying the enrichment program using SCAMPER strategy.

Table 8 shows the paired sample T-test results for testing the difference between the awareness levels of the problem-solving steps of the experimental group before and after the application of the teaching technique. Table 8 shows that the awareness levels of the experimental group in the problem-solving steps is significantly higher after the post-test (after applying the technique), since p-value (0.000) is much lower than the significance level of the study (0.05). This is an indication of the positive effect of the enrichment program using the SCAMPER technique.

Table 8: Paired samples test of the statistical differences between the means of the experimental group's awareness of problem-solving steps

Application	N	Mean	Std. Deviation	T	df	Sig.
pre-test	30	2.39	0.32	4.970	29	0.000
post-test	30	2.82	0.27			

To assess the effectiveness of the enrichment program using the SCAMPER technique in raising the participating students' awareness of the problem-solving steps, Eta squared statistic was calculated. Table 9 shows that the enrichment program is associated with 35.8% of the variation of the students' awareness of the problem-solving steps after the implementation of it using the SCAMPER technique. This result shows the importance of using this program and SCAMPER strategy in the training of students and in raising their awareness in of the steps that they need to follow to solve a problem.

Table 9: Eta squared (η^2), and size of the effect for an enrichment program on increasing students' awareness of the problem-solving steps

Independent	Dependent	Eta	Eta Squared
Enrichment program	Creative Problem Solving Skills	0.598	0.358

Table 10 shows the judging criteria for the results of the question.

Table 10: The judging criteria for the results of the question

range	Possession degree
From 1 to 1.66	Weak
From 1.67 to 2.33	Medium
From 2.34 to 3.00	High

Chapter 5: Discussion and Recommendations

5.1 Introduction

This chapter will include a summary of the research findings and the general findings of the results, the implications of the study, and recommendations for future research.

5.2 Summary of Major Findings

The purpose of this study was to examine the impact of an enrichment program on 57 UAE high school gifted students' creative problem-solving abilities and awareness of the problem-solving steps. The findings of the first question indicate that the enrichment program did produce significant improvements in high school gifted students' creative problem-solving skills. Additionally, results of the second question showed that there are statistically significant differences between the means of the pre-test and post-test for the experimental group after the implementation of the enrichment program. Looking more closely at the mean of the experimental groups in the pre and post-tests, it is found that the experimental group scored significantly higher in the post-test ($m=52.30$) than in the pretest ($m= 42.07$). These findings indicated that there is an improvement in the experimental group students' creative problem-solving skills over time, which confirms the positive impact of the enrichment program using SCAMPER strategy. So, the findings of this study indicated that the enrichment program has significant impact on improving UAE high school gifted students' creative problem-solving skills. This result supports previous studies findings. For example, Cetinkaya found that the students of the experimental group using the creative thinking skills had higher scores in the dimension such as creativity, problem-solving and self-efficacy more than the control group students. (Cetinkaya et

al., 2015). Additionally, SCAMPER strategy was found to be very affective as well in this study. The study of Khawaldeh and Ali (2016) provided similar results to this research study of using SCAMPER strategy. As it has been found that the SCAMPER strategy was very effective and useful among gifted students. In Khawaldeh and Ali's study, the major finding was the experimental group achieved a higher grade in the Torrance creativity test more than the control group (Khawaldeh & Ali, 2016). Also, a number of other previous studies indicated that enrichment programs enhance gifted and talented students' thinking skills (e.g Ceylan, 2020, AlDhaimat et al., 2020). In addition, Harris and de Bruin found that the enrichment program had positive impact on teaching and nurturing creativity for gifted students (Harris & de Bruin, 2017). Also, this finding supports Cetinkaya's findings who reported that the students of the experimental group using the creative thinking skills had higher scores in dimensions such as creativity, problem solving and self-efficacy more than the control group students (Cetinkaya et al., 2015). Therefore, high school teachers in the UAE may need to consider offering their gifted students enrichment programs using SCAMPER strategy to enhance their creative problem-solving skills.

In addition to that this result supports previous studies' findings including Sun-Youn and Jiwon (2020), Drapeau (2014) and Henwood et al. (2015). For example, Henwood et al. found that the application of future problem-solving programs leads students to develop their creative performances, Also the effective Future Problem-Solving Program (FPSP) had a positive impact on improving the students' abilities to know the problem and solve it in creative ways. In addition to that, teaching gifted students with the direct or explicit way is very effective.

The results of the third question in relation to significant differences between the control group's (which did not receive the enrichment program) and the experimental group's (which received the enrichment program) awareness of problem-solving steps before and after the implementation of the enrichment program show that there is a highly significant statistical differences between the awareness levels of the experimental group and the control group of problem-solving steps after the application of the teaching enrichment program using SCAMPER strategy. In addition to that, the result of the fourth question which was about the awareness of the problem-solving steps of UAE gifted high school students shows that the awareness levels of the experimental group in the problem-solving steps is significantly higher after the post-test (after applying the SCAMPER strategy). This is an indication of the positive effect of the enrichment program using SCAMPER technique in enhancing the students' awareness of the problem-solving steps. Some scholarly studies supported the finding of this study (e.g, Karademir, 2016). According to Smedsrud (2018), an enrichment program is one of the most important and useful strategies to teach gifted and talented students problem solving skills. In order to be able to solve the problem, gifted students may need to know about problem-solving steps and how to solve problems effectively. Caring about gifted students is very important to support them to be problem solver, creative and innovators in the future. In addition to that, problem-solving skills is effective for gifted students: it goes through many steps starting from defining the problems, using many resources, finding different solutions, choosing one of the best solutions. Therefore, high school teachers may need to consider offering creative problem- solving enrichment programs to their students.

Additionally, findings of this study indicated that the use of direct instruction in teaching thinking skills is effective strategy. This finding is related to some literature

studies including Sun-Youn and Jiwon's findings in 2020. According to Sun-Youn and Jiwon (2020) the explicit instruction approach was helpful in improving students' writing skills.

According to related literature, teaching tactics that maintain problem-solving skills, creative and critical thinking skills, and improve achievement are the essential elements of gifted students' education. Leaving gifted students without special care will increase the probability of losing their giftedness. Therefore, it is important to teach and enhance gifted students' creative problem-solving skills. Teaching gifted students thinking skills such as problem solving will lead to a positive impact.

This gives all teachers good indicators to teach gifted students in a direct way and give them the instructions in a direct way. Also, teaching gifted students a SCAMPER strategy was very effective for gifted students, so the teachers could apply it in their classroom with some activities such as group working and discussions.

5.3 The Implications of the Study

Findings of this study revealed that the use of SCAMPER strategy and direct instruction are suitable strategies to be used with high school gifted learners to enhance their creative problem-solving skills and increase their awareness level with regard to the problem-solving steps. High school teachers in the UAE may need to consider these strategies in their classroom. Also, findings of this study could help the administrators to be aware of the impact of applying a gifted enrichment program in their school as it allows gifted students to think differently and outside the box.

5.4 Limitations

This recent study is limited to the year 2020-2021 and was carried out in a limited geographical area as this study included a sample of high school gifted students only from the Emirate of Abu Dhabi. This research was limited to two schools with one grade level, which may affect the generalizability of the findings of this study to other schools and Emirates. Future researchers may need to apply the same study with a large number of schools across the UAE.

5.5 Recommendations for Future Research

1. School administrators and teachers should use the SCAMPER strategy to encourage gifted students to be motivated and participate in the future economy.
2. High school principals should consider the use of enrichment units or programs to improve their gifted students' creative problem-solving abilities and motivation to learn.
3. To successfully implement an enrichment program, teachers and administrators should have enough time to prepare, create a program activity and the evaluation methods as well.
4. Policy makers should consider the important roles of the enrichment program for gifted students and its positive impact on students who experience it after the implementation of the program.
5. Teaching creative problem-solving skills for high school gifted students is very important and has a positive impact on students' thinking skills.

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Appendix A

Problem Solving Questionnaire



عزيزي/ عزيزتي الطالب/ة من خلال هذا المقياس يمكنك التعرف على مدى امتلاكك لمهارات حل المشكلات وتكون النتائج دقيقة وواضحة عليك الإجابة بدقة وموضوعية (كما أنت عليه الآن وليس كما تتوقع) ضع إشارة صح أمام كل فقرة من فقرات هذا المقياس والتي تنطبق عليك في حل المشكلات التي تواجهك

تعليمات				
أشر بالعلامة (✓) إزاء كل عبارة في العمود الذي يصفك. ويرجى الإجابة على الأسئلة كما أنت عليه فعلاً (وليس كما تعتقد أنك ينبغي أن تكون عليه)				
ت	عملية حل المشكلة	دائماً	أحياناً	إطلاقاً
1	أستطيع تحديد المشكلات بسرعة عندما أواجه موقفاً ما .			
2	عندما تواجهني مشكلة ، فإنني أصغها بسرعة وبوضوح.			
3	أستخدم الكثير من الأسئلة الذاتية عندما أواجه مشكلة ما.			
4	أستطيع توليد عدد كبير من الأفكار التي تساعدني في حل المشكلة.			
5	أكن الأول دائماً في إختيار فكرة فريدة وحديثة من نوعها.			
6	أسأل نفسي الكثير من الأسئلة المختلفة حول طبيعة المشكلة.			
7	عندما أحتاج إلى إيجاد حلاً لمشكلة فإني أعدُّ كافة المعلومات التي أحتاجها لحلها .			
8	أستطيع تحليل أسباب المشكلة التي تواجهني.			
9	حالما أختار الحل ، أضع خطة التنفيذ مع تسلسل الأحداث اللازمة لاستكمالها .			
10	بعد أن أتم تنفيذ الحل، أبدأ على الفور البحث عن طرق لتحسين الفكرة وتجنب المشاكل في المستقبل.			
11	أعمل جاهداً للنظر في المشاكل من وجهات نظر مختلفة، وإيجاد حلولاً متعددة.			
12	أقيم الحلول المحتملة بعناية ودقة كما أعتقد بها.			
13	عندما أجد الحل ، أعمل على تحقيقه - بغض النظر عن المعارضة التي قد تعرض ذلك الحل.			
14	يكون اتخاذ القرار هو نهاية حل المشكلة .			

Appendix B

SCAMPER Test

استراتيجية الدمج

تساعد استراتيجية الدمج الطلبة والطالبات على توليد الأفكار الجديدة أو البديلة وعلى طرح الأسئلة التي تتطلب منهم التفكير فيما وراء الصندوق، حيث يساعد على تنمية قدراتهم على التفكير الإبداعي..

وتقوم فكرة استراتيجية الدمج على الربط بين فكرتي حل المشكلات واستراتيجية سكاهبر لإنتاج منتج جديد، فمن خلال هذه الاستراتيجية سيقوم الطالب / الطالبة بالقيام بخطوات حل المشكلات للوصول إلى منتج جديد..

الخطوة الأولى :- وهي خطوة اختيار 3 منتجات للوصول إلى منتج جديد ،، وهي أولى خطوات حل المشكلة والتي تتمثل في **تحديد المشكلة**

أما الخطوة الثانية فهي **جمع المعلومات المتعلقة بالمسألة** :- وسيقوم الطالب في هذه الخطوة بجمع المعلومات عن المنتج أو العنصر المراد دمجه مع العنصر الآخر،، أى يمكن للطالب / الطالبة من القيام بجمع المعلومات عن الثلاثة عناصر التي سيتم دمجهما معاً.

وتتمثل الخطوة الثالثة في حل المشكلات في توليد الكثير من الأفكار لهذه العناصر الثلاثة وما يمكن أن ينتج عنهما في النهاية.

أما الخطوة الرابعة فهي **إيجاد الفكرة الأفضل بين الأفكار المعروضة لهذه العناصر** ، ويمكن للطالب من خلال هذه الخطوة اختيار المنتج الأفضل بين المنتجات التي تم عرضها سابقاً.

وتتمثل الخطوة الأخيرة في **إنتاج المنتج النهائي** ،، وهو الحل للمشكلة المعروضة ،، وفي هذه الخطوة يجب أن يكون المنتج ذا قيمة حقيقية لها معنى وتستخدم في الحياة اليومية.

SCAMPER Test (Continued)

استراتيجية الدمج		
اختر ثلاثة عناصر من عناصر القائمة التالية، بحيث يمكن دمجها معا للحصول على منتج جديد يُنال على الإعجاب وله استخدامات عديدة		
فرشاه أسنان ثلاجة كاميرا رقمية جهاز إنذار حريق مذياع المحمول سرير مكنسة كهربائية منقاه الحطب آلة موسيقية آلة تحميل الخبز ورقة بيضاء دفتر كوب سلة	طاولة طعام مكتب قلم حبر سكين آلة خياطة سيارة منشار ميزان حرارة شاحن كهربائي مرآة سحرية حلية منديل مزهرية مفتاح باب	كرسي مكتب قبعة تلفاز صمود مصباح فنجان ساعة قلم رصاص مبراه مكنسة حاسوب دراجة هاتف
العنصر الثالث (3)	العنصر الثاني (2)	العنصر الأول (1)
المنتج النهائي الذي تم التوصل إليه		

ملاحظة: -

تذكر أنه في عملية الدمج ستقوم بدمج عنصر وعنصر آخر أو المزج بين المكونات أو بعض الأجزاء أو إعادة تركيبها أو الدمج بين الأفكار أو الأهداف

مثال: إضافة ساعة رقمية إلى قلم الكتابة، وهي مستوحاة من خطوة الدمج في استراتيجية سكامبر للتفكير الإبداعي..

SCAMPER Test (Continued)

Three Groups in SCAMPER Test



Appendix C

Torrance Thinking Activities

1- لماذا الولد يجلس بقرب البعير؟
2- لماذا يوتي قبعه
3- لماذا لا يوجد لشخص اخر وجه؟
4- لماذا يجلس هكذا؟
5- هل هو قانوم إلى البعير لصيد السمك؟

الإختار ان الثلاثة تلعب على الصورة الموجودة في هذه الصفحة وتعطيك الفرصة ان تفكر واسأل أسئلة بحيث تؤدي اجابتها لمعرفة الأشياء التي تعرفها من قبل ، وان تفرس الأسباب و النتائج الممكنة لما يحدث في الصورة .
انظر إلى الصورة أثناء : ما الشيء الذي أنت متأكد من أنك تستطيع ان تجاوه ؟ وما الذي تحتاج إلى ان تعرفه لكي تفهم ما يحدث ؟ ، ما الذي سمعته ؟ ، ماذا سلك ؟ ، لماذا ؟

الصفحة الثالثة: التوازي

أريد عندما من التوجهه الى العنبر باستخدام الطريق القديم الى العنبر هذه الطريقه بالعمود القديم ، يجب ان يكون مشهور ، العنبر هو الشقة
الوقت الطويله سنتي اريد تعلم الطريق او طريقها او ايجادها او طريقها هذا الطريق القديم او الشقة القديمه
منذ ان اختار في أثناء ان يجلس هذه الصورة . اريد ان اقول ان كل من بين العنبر او الطريق . العنبر القديم او طريقه يمكنه ان يمشي هكذا على ما يشاء .
أثناء ان يمشي هكذا على ما يشاء .
والا انما : عند عرفت منظر العنبر

الوقت الطويله سنتي اريد تعلم الطريق او طريقها او ايجادها او طريقها هذا الطريق القديم او الشقة القديمه
منذ ان اختار في أثناء ان يجلس هذه الصورة . اريد ان اقول ان كل من بين العنبر او الطريق . العنبر القديم او طريقه يمكنه ان يمشي هكذا على ما يشاء .
أثناء ان يمشي هكذا على ما يشاء .
والا انما : عند عرفت منظر العنبر

Appendix D

Lesson Plan Week 1

الخطة الدراسية
(نموذج الخطة الدراسية باستخدام استراتيجيات حل المشكلات)

الأسبوع الأول " مفهوم حل المشكلات

المخرجات والأهداف:

1. أن تكتشف الطالبة مفهوم حل المشكلات
2. أن تستنتج الطالبة الخطوة الأولى في حل المشكلة وهي " تحديد المشكلة "

الوسائل التعليمية: استخدام المكتبة المدرسية + استخدام الانترنت + عرض فيديو في برنامج التيمز + استخدام برنامج البادليت

إجراءات التدريس

أولاً: التهيئة الحافزة (7) دقائق

فيديو عن حل المشكلات يعرض مفهوم تحديد المشكلة
أسئلة مناقشة حول الفيديو " ما المقصود بتحديد المشكلة ؟ ما
المشاكل التي يمكن اختيارها لإيجاد حلول أخرى لها ؟

عرض الدرس

مناقشة الطالبات وعددهن 30 طالبة في الأسئلة لتحديد المشكلة
صياغة وتحديد المشكلة من خلال عرض المناقشات بين مجموعات
الطالبات والاتفاق على صياغة محددة للمشكلة

Lesson Plan Week 1 (Continued)

الخطة الدراسية

(نموذج الخطة الدراسية باستخدام استراتيجية حل المشكلات)

الأسبوع الأول " مفهوم حل المشكلات

دور المتعلم :-

كتابة الخطوة الأولى لحل المشكلات على برنامج البادليت
التطبيق العملي للخطوة الأولى لحل المشكلة وهي تحديد المشكلة
" وهنا نتناول مشكلة ذبول النبات واصفرار أوراقه على الرغم
من سقيه للمياه كل يوم
المناقشة والعصف الذهني على تحديد المشكلة مع الأسباب التي
أدت إلى حدوث هذه المشكلة

دور المعلم :-

المتابعة المستمرة مع الطالبات
المناقشة الشفوية في العصف الذهني أثناء تطبيق الطالبات لحل
المشكلة

التقييم للأسبوع الأول :-

تحديد الخطوة الأولى للمشكلة في مشكلة يتم اختيارها من قبل
الطالبة وعرضها على الطالبات في الصف الافتراضي من خلال
إعداد عرض تقديمي أو بوستر عن الخطوة التي تمت دراستها

Lesson Plan Week 2

<p>الخطة الدراسية</p> <p>(نموذج الخطة الدراسية باستخدام استراتيجيات التعلم القائم على حل المشكلات)</p> <p>الأسبوع الثاني " جمع البيانات الخاصة بالمشكلة "</p>	
<p>المخرجات والأهداف:</p> <p>1. أن تتعرف الطلبة على الخطوة الثانية في حل المشكلة " جمع البيانات "</p> <p>2. أن تقوم الطلبة بجمع البيانات الخاصة بالمشكلة</p>	
<p>الوسائل التعليمية: عرض فيديو عن مفهوم جمع البيانات لحل المشكلة رحلة افتراضية إلى مكتبة مدرسة الختم ،، عبر قناة مكتبة المعارف إلكترونياً</p>	
<p>أسلوب التدريس: جماعي في الصف الافتراضي</p>	
<p>إجراءات التدريس</p> <p>أولاً: التهيئة الحافزة (7 دقائق)</p> <p>فيديو عن جمع البيانات الخاصة بالمشكلة / أسئلة مناقشة حول الفيديو</p> <p>1)) ما المقصود بجمع البيانات الخاصة بالمشكلة؟</p> <p>2)) كيف يمكننا جمع البيانات الخاصة بالمشكلة؟</p> <p>3)) ما المصادر التي يمكننا أن نجمع المعلومات من خلالها ؟</p>	
<p>عرض الدرس</p> <p>جمع المعلومات: تقسيم الطالبات لفرق عمل لجمع المعلومات عن أسباب المشكلة وتوجيههم لكيفية الاستفادة من المعلومات ويقوم المعلم (رئيس الجلسة) بتعيين قائد لكل مجموعة لتنظيم عمل المجموعة.</p> <p>تحديد الطرق التي يمكن من خلالها جمع البيانات " الانترنت - المجلات والجرائد - الموسوعات العلمية - الكتب العلمية "</p> <p>الذهاب إلى رحلة افتراضية إلى مكتبة مدرسة الختم</p>	

Lesson Plan Week 2 (Continued)

الخطة الدراسية

(نموذج الخطة الدراسية باستخدام استراتيجية التعلم القائم على حل المشكلات)

الأسبوع الثاني " جمع المعلومات الخاصة بالمشكلة "

دور المتعلم :-

بعد عرض الفيديو ، تقوم طالبة واحدة بشرح مفهوم جمع البيانات ومناقشتها مع الطالبات
كتابة طرق جمع البيانات على برنامج البوربوينت والتي تشمل المصادر
الإلكترونية / المجلات والكتب العملية / الخبراء وغيرها من المصادر
حل سؤال تفكير من أسئلة تورانس للتفكير الإبداعي " فاصل ونواصل "
تقييم الأقران لبعضهم البعض في معرفة الخطوة الثانية لحل المشكلات

دور المعلم :-

المتابعة المستمرة مع الطالبات
المناقشة الشفوية في الحصف الذهني أثناء تطبيق الطالبات لحل المشكلة

التقييم للأسبوع الرابع :-

إعداد رحلة افتراضية من قبل الطالبات للذهاب إلى المكتبة لجمع المعلومات
الخاصة بالمشكلة

Lesson Plan Week 3

<p>الخطة الدراسية (نموذج الخطة الدراسية باستخدام استراتيجية التعلم القائم على حل المشكلات)</p> <p>الأسبوع الثالث " وضع الفروض الخاصة بالمشكلة"</p>
<p>المخرجات والأهداف:</p> <p>1. أن تتعرف الطالبة على الخطوه الثالثة في حل المشكلة " وضع الفروض الخاصة بالمشكلة "</p> <p>2. أن تقوم الطالبة بوضع الفروض الخاصة بالمشكلة</p>
<p>الوسائل التعليمية: عرض صور يوضح وضع الفروض الخاصة بالمشكلة ، ومفهوم وضع الفروض- بردامج Nearpod التفاعلي – بردامج الفورم للتقييم</p>
<p>أسلوب التدريس: جماعي في الصف الافتراضي</p>
<p>استراتيجيات التدريس</p> <p>أولاً: التهيئة الحافزة (7 دقائق) فيديو عن حل المشكلات / أسئلة مناقشة حول الفيديو 1)) ما المقصود بوضع الفروض؟ 2)) إعطاء أمثلة عن وضع الفروض</p> <p>عرض الدرس وضع الفروض الخاصة بالمشكلة :</p> <p>كل مجموعة تقوم بإعطاء اقتراح لحل المشكلة مثال:</p> <p>*المجموعة الأولى : تقترح كثرة المياه تؤدي إلى ذبول النبات *المجموعة الثانية تقترح فكره أخرى ** المجموعة الثالثة تقترح فكره أخرى</p>

Lesson Plan Week 3 (Continued)

الخطة الدراسية

(نموذج الخطة الدراسية باستخدام استراتيجية التعلم القائم على حل المشكلات)

الأسبوع الثالث " وضع الفروض الخاصة بالمشكلة

دور المتعلم :-

كتابة الخطوة الثالثة على برنامج التدريب التفاعلي
التطبيق العملي لمشكلة ذبول النبات واصفرار الأوراق
العصف الذهني حول المشكلة
حل السؤال التفكيرى لتورانس " فاصل ونواصل "

دور المعلم :-

المتابعة المستمرة مع الطالبات
المناقشة الشفوية في العصف الذهني أثناء تطبيق الطالبات لحل المشكلة

التقييم للأسبوع الثالث :-

عمل لقاءات افتراضية مع مجموعة مختصين لوضع الفروض الخاصة
بالمشكلة والتواصل عبر مواقع التواصل الاجتماعى

Lesson Plan Week 4

الخطوة الدراسية

(نموذج الخطوة الدراسية باستخدام استراتيجيات التعلم القائم على حل المشكلات)

الأسبوع الرابع " التحقق من صحة الفروض الخاصة بالمشكلة**المخرجات والأهداف:**

1. أن تتعرف الطالبة على الخطوة الرابعة في حل المشكلة " التحقق من صحة الفروض الخاصة بالمشكلة "
2. أن تقوم الطالبة بالتحقق من صحة الفروض
3. أن تختار الطالبة أفضل الحلول للمشكلة

الوسائل التعليمية: المكتبة المدرسية الافتراضية + زياره افتراضية لممثل الأوراق + استخدام الانترنت+ عرض فيديو عن التحقق من صحة الفروض + برنامج البانليت

أسلوب التدريس:

جماعي في الصف لافتراضي

استراتيجيات التدريس**أولاً: التهيئة الحافزة (7 دقائق)**

- فيديو عن التحقق من صحة الفروض الخاصة بالمشكلة / أسئلة مناقشة حول الفيديو
- 1)) ما المقصود بالتحقق من صحة الفروض؟
 - 2)) كيف يمكن التحقق من صحة الفروض ؟

اختبار صحة الفروض واختيار الأنسب منها

- تتم مناقشة مجموعات العمل في كافة الآراء والفروض المقترحة ومشاركة الجميع لكافة الفروض لاختيار الأنسب منها والقابل للتطبيق العملي على أن تكون معايير الفرض الأنسب هي قلة الكلفة والوقت والكفاءة والمجهود

Lesson Plan Week 4 (Continued)

الخطوة الدراسية

(نموذج الخطوة الدراسية باستخدام استراتيجيات التعلم القائم على حل المشكلات)

الأسبوع الرابع " التحقق من صحة الفروض الخاصة بالمشكلة

دور المتعلم :-

الإجابة على سؤال المعلم حول كيفية التحقق من صحة الفروض الخاصة بالمشكلة

بعد عرض الفيديو ، كتابة الآراء كل حسب مجموعته

العصف الذهني حول الآراء المقترحة

استراتيجية ماذا لو ...! للتحقق من صحة الفروض

حل سؤال تفكيري من أسئلة تورانس للتفكير الإبداعي " فاصل ونواصل " كتابة الخطوة الرابعة من حل المشكلات على رابط البادليت

دور المعلم :-

المتابعة المستمرة مع الطالبات

المناقشة الشفوية في العصف الذهني أثناء تطبيق الطالبات لحل المشكلة

التقييم للأسبوع الرابع :-

إعداد أسئلة شفوية ومناقشات من قبل الطلبة ، والإجابة عنها مع المعلم الصغير

Lesson Plan Week 5

الخطة الدراسية

(نموذج الخطة الدراسية باستخدام استراتيجية التعلم القائم على حل المشكلات)

**الأسبوع الخامس " تنفيذ الحل وتقويم التقدم الخاص بالمشكلة
واستراتيجية سكامير**

المخرجات والأهداف:

1. أن تقوم الطالبة بوضع خطة عمل خاصة بالمشكلة
2. أن تتحقق الطالبة من تنفيذ الحل وتقويم التقدم الخاص بالمشكلة
3. أن تتعرف الطالبة على خطوات استراتيجية سكامير للتفكير الإبداعي

الوسائل التعليمية: عرض صور عن مشكلة ذبول النباتات + استخدام المكتبة المدرسية
+ زيارة افتراضية + استخدام الانترنت + عرض فيديو + استخدام puzzles

أسلوب التدريس: جماعي في الصف لافتراضي

خامساً

اختيار العرض الأنسب والأفضل بما يوفر الوقت والجهد والتكلفة وبما يتناسب مع الإمكانيات المتاحة وتطبيقها
عرض تقديمي لكل مجموعة ،، أو لكل طالبة حسب المشكلة
يتم عرض المشكلة من قبل الطالبات على شكل عرض تقديمي أو بوستر
تدريس استراتيجية سكامير للطالبات

Lesson Plan Week 5 (Continued)

الخطة الدراسية

(نموذج الخطة الدراسية باستخدام استراتيجية التعلم القائم على حل المشكلات)

الأسبوع الخامس " تنفيذ الحل وتقويم التقدم الخاص بالمشكلة

دور المتعلم :-

بعد عرض الفيديو ، كتابة الآراء كل حسب مجموعته
العصف الذهني حول الآراء المقترحة
حل سؤال تفكيري من أسئلة تورانس للتفكير الإبداعي " فاصل وتواصل "
كتابة الخطوة الخامسة من حل المشكلات على رابط البانليت
التطبيق العملي لخطوات سكامير للتفكير الإبداعي

دور المعلم :-

المتابعة المستمرة مع الطالبات
المناقشة الشفوية في العصف الذهني أثناء تطبيق الطالبات لحل المشكلة

التقييم للأسبوع الخامس :-

عمل بوستر نهائي أو بوربوينت وشرحه من قبل الطالبات يتضمن خطوات
حل المشكلة كاملة مع الخطوة الأخيرة
حل مسألة التفكير الإبداعي تورانس مع المناقشة في المسألة

Appendix E

Assessing Students' Understanding (PADLET Program)

The screenshot shows a Padlet board titled "اكتبي الخطوة الأولى لحل المشكلات" (Write the first step to solve the problem). The board contains several student contributions, each with a name, a description of their approach, and an "Add comment" button. The contributions are as follows:

- WALAA IMAM:** تحديد المشكلة واسبابها (Identify the problem and its causes).
- Tala osama:** استوعاب المشكلة والبدء بالتفكير (Understand the problem and start thinking). Includes an image of a bear thinking with the text "Think, think, think."
- Maitha:** تحديد المشكلة (Identify the problem).
- Maria:** Consider your life experiences and identify ur problem. Based on ur life.
- shima:** اول شي نحدد المشكلة و نرى الاسباب التي ادت الي حدوث المشكلة (First, we identify the problem and see the causes that led to the occurrence of the problem).
- Sama:** تحديد المشكلة و محاولة رؤيتها من جميع الجوانب المتاحة و وضع خطة مناسبة لحلها (Identify the problem and try to see it from all available angles and set a suitable plan to solve it).
- Roaa Khaled:** محاولة ايجاد حل للمشكلة من وجهة نظر شخص اخر (Try to find a solution to the problem from the perspective of another person).
- marwa mohammed:** تفكير خارج الصندوق (Thinking outside the box).

Appendix F

Approval Letter from the Ministry of Education (MOE)



Muna Mohammad Janahi

Mon 10/12/2020, 2:03 PM

Alyazia Alshehhi

↻ Reply all | ▾

This message was sent with high importance.

You forwarded this message on 11/7/2020 11:14 PM



Download

عزيزتي اليازية الشحي، في طي ليريد نسخة من التعميم مع تمنياتنا بالتوفيق.

@moe.gov.ae>

Sent: Monday, October 12, 2020 1:42 PM

To: AL BADIYAH <420@moe.gov.ae>; Al Reyadah School <1383@moe.gov.ae>; Umm Al Arab <1722@moe.gov.ae>; Al Shawamekh School <1384@moe.gov.ae>; BAYAH SCHOOL <1565@moe.gov.ae>; QATR AL NADA <282@moe.gov.ae>

Cc: Lubna Alshamsi <lubna.alshamsi@moe.gov.ae>; Humaid Abdulla :ADEK- HQ <humaid@moe.gov.ae>; Khaled Al Abri <Khaled.AlAbri@moe.gov.ae>; Khaled Al Ansari <khaled.alansari@moe.gov.ae>; Rahma Al Rubaei <rahma-km.alrubaei@moe.gov.ae>; Thuraya Al Salemi :ADEK- HQ <Thuraya.Alsalmi@moe.gov.ae>; Fatima Murad Ali Al Mazam <fatima.almazam@moe.gov.ae>; ClusterLeadsAD <ClusterLeadsAD@moe.gov.ae>; LeadPrincipalsAD <LeadPrincipalsAD@moe.gov.ae>; Muna Mohammad Janahi <Muna.Janahi@moe.gov.ae>

Subject: تسهيل مهمة الباحثة اليازية الشحي من جامعة الإمارات العربية المتحدة

Importance: High

السلام عليكم ورحمة الله وبركاته
السادة الإكفيل / مدراء المدارس المحترمين

تقوم الباحثة / اليازية الشحي بالتحضير للدراسات التي ستحصل على شهادة الماجستير من جامعة الإمارات العربية المتحدة، وقد وضعت الظروف النهائية لإجراء بحث الفخرج بعنوان: " أثر دراسة وحدة القراءة لطلبة الصفوف المتوسطة ونمطها باستخدام نماذج على الطلبة المتفهمين من المرحلة المتوسطة في إمارة أبوظبي".

حيث يهدف الاستبيان إلى جمع المعلومات التي تساهم في معرفة تأثير الوحدة الإثرائية على تحسين مهارة حل المسويات ومهارة الإبداع لدى الطالبات الموهوبات في المرحلة المتوسطة (الصفين التاسع والعاشر) بإمارة أبوظبي، ونظرة ترحب منكم بالتكرم بالإجابة على أسئلة الاستبيان والتي سيتم تحليلها على مرحلتين استبيان قبل وسيتم إعطاء الاستبيان مرة أخرى للطالبات بعد مرحلة تطبيق الوحدة الإثرائية والذي يساهم في قياس مدى استفادة الطالبة من البرنامج المطبق.

ونكبه بغير الطابقت الموهوبات في المرحلة المتوسطة في المدارس المتوسطة الإجابة بـ 44 على أسئلة الاستبيان. حيث إن مشاركتكم بهذا الموضوع إلى نتائج دقيقة وواضحة كما نأمل بأن تكون المعلومات التي سيتم مشاركتها بما إن يتم استخدامها إلا لأغراض البحث العلمي والتطوير وتغذية على المتقدمة والمجتمع المحلي. ونتمنى من خلال مشاركتكم القيمة على رابط الاستبيان التالي:

https://bluecrm.moe.gov.ae/duu/a.aspx?i=20329_1_AAAAAAAACu3B

لتراسل مع الباحثة الأستاذة / اليازية الشحي على البريد الإلكتروني:
Alyazia.Alshehhi@moe.gov.ae

والصلى على رسوله وآله الطيبين الطاهرين.

UNITED ARAB EMIRATES
MINISTRY OF EDUCATION

الإمارات العربية المتحدة
وزارة التربية والتعليم

قطاع العمليات المدرسية
School Operations Sector

Appendix G

Consent Letter



موافقة ولي أمر

يود الباحث إجراء دراسة بعنوان (أثر دراسة وحدة إثرائية لحل المشكلات ودمجها باستراتيجية سكامبر على الطلبة الموهوبين من الحلقة الثالثة في إمارة أبوظبي)

بإشراف الأستاذة الدكتور/ هالة الحويرص رئيس قسم التربية الخاصة بكلية التربية جامعة الإمارات وذلك للحصول على درجة الماجستير في التربية الخاصة ومن متطلبات إجراء هذه الدراسة عمل وحدة إثرائية للطلبة الموهوبين في الحلقة الثالثة من خلال تطبيق استر لتيجية سكامبر ودمجها بحل المشكلات

يرجى كتابة رأيكم في مشاركة ابنتكم في هذه الوحدة الإثرائية ..

غير موافق ()

موافق ()

رقم تواصل ولي أمر الطالبة

رقم الطالبة

شاكرين لسيادتكم حسن تعاونكم