

**Creativity Development for  
High Ability Arabic English  
Language Learners within the  
International Future Problem Solving Programme**

A thesis presented as partial requirement

for the

Master of Education Degree

for the

University of Canterbury

By

***Bronwyne Rankin***

**University of Canterbury**

2019

## TABLE OF CONTENTS

<b>Acknowledgements</b>	<b>PAGE 9</b>
<b>Abstract</b>	<b>PAGE 10</b>
<b>Glossary</b>	<b>PAGE 11</b>
<b>Chapter 1 INTRODUCTION</b>	<b>PAGE 14</b>
<b>1.1 Background to this study</b>	<b>PAGE 14</b>
<b>1.1.2 Statement of the problem</b>	
<b>1.1.3 Purpose of the study</b>	
<b>1.2 Context for this study</b>	<b>PAGE 16</b>
1.2.1 Setting the scene for change within Abu Dhabi and the United Arab Emirates Education	
1.2.2 Setting the scene for change within girls' education within the United Arab Emirates	
1.2.3 Setting the scene for developing creativity in the United Arab Emirates	
1.2.4 The Abu Dhabi school model creativity alignment to Future Problem Solving	
1.2.5 Setting the scene for developing creativity within the participating school	
<b>1.3 IDENTIFYING CHALLENGES IN GIFTED AND TALENTED EDUCATION</b>	<b>PAGE 18</b>
1.3.1 Evolving changes within the UAE education climate for Gifted Education	
1.3.2 Why investigate creativity?	
1.3.3 Future Problem Solving and Creativity	
1.3.4 Future Problem Solving Global Issues learning Environment	
1.3.5 Underachievement	
1.3.6 Teacher assumptions identified as initial barriers to developing creativity for gifted and talented English language learners.	
<b>1.4 SIGNIFICANCE OF THIS STUDY</b>	<b>PAGE 20</b>
1.4.1 Contemporary value given to creativity development in education	
1.4.2 Why explore creativity within this school?	
<b>RESEARCH QUESTIONS</b>	<b>PAGE 21</b>
<b>CHAPTER 2 LITERATURE REVIEW</b>	<b>PAGE 22</b>

<b>CHAPTER 2 INTRODUCTION</b>	
<b>2.1 WHAT IS GIFTED AND TALENTED?</b>	<b>PAGE 23</b>
<b>2.2 SELECTING TERMS IN GIFTED AND TALENTED EDUCATION</b>	<b>PAGE 23</b>
<b>2.3. Defining Gifted and Talented</b>	<b>PAGE 23</b>
2.3.1 Biological to Environmental (nature/nurture) Definitions	
2.3.2 Conservative to Liberal Definitions	
2.3.3 Performance to Potential Definitions	
2.3.4 Single to Multi-category definitions	
2.3.5 Abu Dhabi Education Council Definition	
2.3.6 The Participating School Definition of Gifted and Talented	
<b>2.4 Defining Creativity?</b>	<b>PAGE 25</b>
2.4.1 Creativity Focus in Education	
<b>2.5 Creativity Theories that Influence Education</b>	<b>PAGE 27</b>
2.5.1 Guilford	
2.5.2 Treffinger	
2.5.3 Renzulli and Future Problem Solving	
2.5.4 E. Paul Torrance, founder of the Future Problem Solving Programme	
<b>2.6 RECORDING AND ASSESSING CREATIVITY</b>	<b>PAGE 29</b>
2.6.1 Connecting Creativity Assessment Rationale to Future Problem Solving	
<b>2.7 TORRANCE TEST OF CREATIVE THINKING (TTCT)</b>	<b>PAGE 32</b>
2.7.1 Rationale for the measurement activities in TTCT	
<b>2.8 CREATIVE CHARACTERISTICS OF ENGLISH LANGUAGE LEARNERS THAT MAY IMPACT ON THIS STUDY</b>	<b>PAGE 32</b>

<b>2.9 ACTION RESEARCH FRAMEWORKS APPLIED WITHIN THIS STUDY</b>	<b>PAGE 33</b>
2.9.1 Transformative Practitioner Action Research	
<b>LITERATURE REVIEW SUMMARY</b>	<b>PAGE 34</b>
<b>Chapter 3 RESEARCH METHODOLOGY</b>	<b>PAGE 36</b>
<b>CHAPTER 3 INTRODUCTION</b>	
<b>3.1 Ontological and Epistemological Relevance</b>	<b>PAGE 36</b>
<b>3.2 Practitioner Action Research</b>	<b>PAGE 37</b>
<b>3.3 Personal Biography Impact</b>	<b>PAGE 38</b>
<b>3.4 Ethical Considerations</b>	<b>PAGE 38</b>
<b>3.5 Mixed Methodology Limitations And Strengths</b>	<b>PAGE 39</b>
<b>3.6 Methodology For Analyzing The TTCT Figural Tests A And B</b>	<b>PAGE 40</b>
<b>3.7 Theory Linking Creative English Language Characteristics To Classroom     Curriculum Learning</b>	<b>PAGE 41</b>
<b>3.8 English Language Learner Creative Skills Questionnaire</b>	<b>PAGE 41</b>
<b>3.9 Teacher respondents for the ELL Questionnaire</b>	<b>PAGE 42</b>
<b>Table 1</b> Teacher Grade Distribution	
<b>3.10 Practitioner Action Research Design in This Study</b>	<b>PAGE 43</b>
<b>3.10.1 Step 1: Identifying the Problem prior to Intervention.</b>	<b>PAGE 44</b>
Description Of The Difference In Teaching Methods Offered In FPS Classes And Non-FPS Classes. Non-Future Problem Solving Classroom learning environments	
<b>3.10.2 Step 2: Planning and implementing action to improve and     better understand the problem</b>	<b>PAGE 44</b>
General Student Participant Identification and Description <b>Table 2</b> Grade Level Learning Environment Cross-tabulation 1 Group 1.0: Students Participating in FPS. Group 2.0: Not participating in FPS	
<b>3.10.3 Step 3. Monitor And Evaluate Success Of The Intervention</b>	<b>PAGE 47</b>
Data Collection Validity, Reliability And Internal Credibility Validity Internal Credibility	

Reliability

Torrance Tests of Creative Thinking Data Gathering Analysis Methodology

Identifying Creativity In The TTCT

TTCT Figural Scoring, Checklist Of Creative Strengths Leading

To The Creativity Index

Creativity Identification Measures Within The Torrance Test Of Creative Thinking Activities

**3.12 Step 4: Report the Findings** **PAGE 52**

**3.12.1** Torrance Test for Creative Thinking (TTCT) Analysis Methodology

**3.12.2** English Language Learners Questionnaire Methodology

**3.13 Step 5 Recommendations** **PAGE 53**

**Methodology Chapter Summary** **PAGE 53**

**CHAPTER 4 REPORTING RESULTS** **PAGE 54**

**CHAPTER 4 INTRODUCTION**

**4.1 Presentation and Analysis of Torrance Test for Creative Thinking (TTCT)** **PAGE 55**

Figural Pre and Post Test Results

**4.2 Reporting on Torrance Test for Creative Thinking** **PAGE 56**

**4.2.1** Torrance Test for Creative Thinking

**Fluency** Future Problem Solvers and Not Future Problem Solvers

**Table 3** Fluency Descriptive Statistics  
Fluency Profile Plot Pre and Post Test

**4.2.2** Torrance Test for Creative Thinking

**Flexibility** (Resistance to Closure) Future Problem Solvers and  
Not Future Problem Solvers

**PAGE 57**

**Table 4** Flexibility Descriptive Statistics  
Flexibility Profile Plot Pre and Post Test

<b>4.2.3</b>	Torrance Test for Creative Thinking	
	<b>Originality</b> Future Problem Solvers and Not Future Problem Solvers	<b>PAGE 58</b>
	<b>Table 5</b> Originality Descriptive Statistics Originality Profile Plot Pre and Post Test	
<b>4.2.4</b>	Torrance Test for Creative Thinking	
	<b>Elaboration</b> Future Problem Solvers and Not Future Problem Solvers	<b>PAGE 59</b>
	<b>Table 6</b> Elaboration Descriptive Statistics Elaboration Profile Plot Pre and Post Test	
<b>4.2.5</b>	Torrance Test for Creative Thinking	
	<b>Creativity Index</b> Future Problem Solvers and Not Future Problem Solvers	<b>PAGE 60</b>
	<b>Table 7</b> Creativity Index Descriptive Statistics Creativity Index Pre and Post Test Profile Plot	
	<b>Table 8</b> Creativity Pre and Post Test Averages in National Age Percentiles	<b>PAGE 61</b>
	<b>Table 9</b> Analysis of Torrance Means	<b>PAGE 61</b>
<b>4.2.6</b>	Summary of Torrance Test of Creativity Analysis of Means	<b>PAGE 62</b>
<b>4.3</b>	<b>Reporting on the English Language Learner's</b>	<b>PAGE 62</b>
	<b>Creative Characteristics questionnaire</b>	
<b>4.3.1</b>	<b>Table 10</b> English Language Learner Literacy Teachers Questionnaire Group Response	<b>PAGE 63</b>
<b>4.3.2</b>	Conclusions From The English Language Learners Creative Characteristics Questionnaire	<b>PAGE 65</b>
<b>DISCUSSION CHAPTER 5</b>		
<b>CHAPTER 5 INTRODUCTION</b>		<b>PAGE 67</b>
<b>5.1</b>	Other Environmental Factors That May Have Influenced Creativity Development	<b>PAGE 67</b>
<b>5.1.1</b>	Innovation Focus In The United Arab Emirates	
<b>5.1.2</b>	Teacher Impact On Creativity Development Transformation	
<b>5.1.3</b>	Creative Characteristic And Traits In English Language Learners Impact	

## On Creativity Development Transformation

### 5.1.4 Transformative Impact of Future Problem Solving

### 5.2 Positioning Creativity Development in Future Problem Solving and Relevant Educational Theory **PAGE 69**

#### 5.2.1 Renzulli

#### 5.2.2 Gagné

#### 5.2.3 Scholastic Testing Service, Inc. and Future Problem Solving Program International collaborative longitudinal study

#### 5.3.4 The Torrance Test for Creative Thinking Figural Test Tool as an assessment tool for creativity **PAGE 70**

### **Discussion Chapter Summary **PAGE 71****

### **CHAPTER 6 CONCLUSIONS **PAGE 71****

### **CHAPTER 6 INTRODUCTION**

### **6.1 Significance Of This Study **PAGE 71****

### **6.2 Implications And Recommendations For Future Practice **PAGE 72****

#### 6.2.1 Stepping Up Into Deliberate Education Effort in Creativity Development

#### 6.2.2 Identifying Links Between Curriculum Content and Future Problem Solving

#### 6.2.3 Creativity As A Channel For Academic Development

#### 6.2.4 Building teacher aptitude in developing diverse creative learning environments

#### 6.2.5 Channels Of Communication For Decision Makers in Lead Roles of Teacher Professional Development to Improve Creative Learning Opportunities For High Ability Students

#### 6.2.6 Understanding creativity within English Language Learner Characteristics.

#### 6.2.7 Collaborative Learning In Rapidly Changing Education Environments To Address Learning Barriers For High Ability Students

### **6.3 Final Recommendations For Further Research **PAGE 75****

### **References **PAGE 76****

### **Appendices **PAGE 82****

<b>Appendix 1:</b> Introduction Letter	<b>PAGE 82</b>
<b>Appendix 2:</b> Parent /Caregiver Declaration of Participation Consent	<b>PAGE 83</b>
<b>Appendix 3:</b> Principal Declaration of Consent for participation of this Abu Dhabi Education Council School	<b>PAGE 84</b>
<b>Appendix 4:</b> Information for Questionnaire Respondents	<b>PAGE 85</b>
<b>Appendix 5:</b> Consent Form for Questionnaire Literacy of Teacher Respondents	<b>PAGE 86</b>
<b>Appendix 6:</b> Creative English Language Characteristics Literacy Teacher Questionnaire Pre- Test	<b>PAGE 87</b>
<b>Appendix 7:</b> Creative English Language Characteristics Literacy Teacher Questionnaire	<b>PAGE 88</b>

## **Acknowledgements**

The following thesis is a journey I have been supported on by a number of guides whose wisdom, patience understanding and inspiration have been invaluable.

Firstly my respect and thanks to the University of Canterbury supervisors, Janinka Greenwood, John Everett and Una Cunningham. The guidance, feedback, questioning and respect you gave to this study was an invaluable energizing force.

To Principal Bakhita Al Neyadi whose leadership, constant encouragement and interest in creativity development impact on students, gave this study a positive light always.

I thank the Abu Dhabi Education Council for their support, specifically Dr Sarah Bond and the participating school's colleagues and friends who are also building this plane while flying it. I thank you for the professional debate and encouragement. Opportunities to explore creativity in education in its many forms were invaluable.

My genuine thanks to the participants and responding teachers in this study who so willingly opened their own perspectives and experiences and gave this study the authenticity it needed.

To my husband David and my children Ella and Conner, thank-you for your constant encouraging insight and vision supporting me.

Finally, the journey behind this study began decades ago. Over these years I have been enlightened by the experiences and stories of many creative students, friends and family. I thank-you all for lifting my consciousness to value the dynamic impact creativity development and Future Problem Solving has had on your lives.

## **Abstract**

This study investigates the impact of the International Future Problem Solving Programme on the development of creativity. The study used a mixed methodology approach to measure and reflect upon change in creativity and a possible impact upon school attainment for students working within a specific programme. Comparative quantitative data was collected through The Torrance Test for Creativity (TTCT) and further supported by a creative English Language Learner (ELL) characteristics and traits questionnaire.

The findings indicated that creativity measures within the TTCT showed positive development for students learning within the Future Problem Solving programme compared to students who were not in the programme. The English Language Learner questionnaire further supported the finding that students learning within Future Problem Solving appear to be more likely to access and apply creative characteristics and traits that could link well to other classroom learning.

Although the study was limited to only one school in the United Arab Emirates, it may contribute towards an understanding of the potential strengths of the international Future Problem Solving Programme for developing creativity. The findings may suggest possible solutions to initial barriers that were revealed in the learning environment for Gifted and Talented learners in the UAE who are currently experiencing an evolving and rapidly changing education system.

The findings of this study could have implications for teachers working with high ability children who are learning within an English medium as English Language learners. These implications could possibly be used to guide educators interested in a relationship between growth in student attainment and creativity development for high ability learners.

## **Glossary**

**ADEC** - the Abu Dhabi Education Council was established in 2005 by the United Arab Emirates President. The Council seeks to develop education and educational institutions in the Emirate of Abu Dhabi. More recently in 2017, ADEC has changed to now be recognized as ADEK, Abu Dhabi Education Knowledge.

**Ashton Testing Inc.** The Ashton Testing services are an international body who administer tests for institutions and organizations.

**Abu Dhabi School Model:** The objectives of the ADSM are to: foster a child-centered learning environment; Develop Arabic and English language abilities, critical thinking and cultural and national identity and to standardize the curriculum, pedagogy, resources and support across all ADEC schools.

**Convergent thinking:** describes the ability to give the "correct" answer to standard questions that do not require significant creativity, for instance in most tasks in school and on standardized multiple-choice tests.

**Creativity Index:** Torrance Index for creativity is derived from five norm referenced measures and thirteen additional creative strengths that are criterion referenced measures.

**Descriptive Statistics:** Descriptive statistics are statistics that quantitatively describe or summarize features of a collection of information.

**Divergent thinking:** Divergent thinking is a thought process or method used to generate creative ideas by exploring many possible solutions.

**Education First publication 2015:** is the vision and mission adopted by the Abu Dhabi Education Council 2015 which states the vision to be recognised as a world class education system that supports all learners in reaching their full potential to compete in the global market

**EMSA** (External Measure of Student Achievement) are standardized tests designed to measure individual student performance in all Abu Dhabi Public Schools. The objective of EMSA is to establish an external assessment baseline that is based on international standards.

**Future Problem Solving (FPS ):** Founded by Dr. Ellis Paul Torrance in 1974, the Future Problem Solving Programme was created to stimulate critical and creative thinking skills and to encourage students to develop a vision for the future.

**Future Problem Solving Categories:** A list of 16 different topics that are used to assist students to generate ideas from a variety of sources: Arts & Aesthetics, Physical Health, Psychological Health, Basic Needs, Defense, Economics, Law & Justice, Business & Commerce, Transportation, Social Relationships, Environment, Education, Technology, Recreation, Government & Politics

**Future Scene:** The Future Scene is a one-page written scenario in an imagined future based on the current topic within the Future Problem Solving Programme. Competitors in Future Problem Solving find potential problems in the future scene based on logic and their topic research preparation.

**GATE:** Gifted education (also known as Gifted and Talented Education (GATE), Gifted and Talented (GAT), is a broad term for special practices, procedures, and theories used in the education of children who have been identified as gifted or talented.

**Torrance Test for Creativity (TTCT):** created by Ellis Paul Torrance, the Torrance Tests of Creative Thinking (TTCT), is a test of creativity that originally involved simple tests of divergent thinking and other problem-solving skills, scored on four scales:

Fluency. The total number of interpretable, meaningful, and relevant ideas generated in response to the stimulus.

Flexibility. The number of different categories of relevant responses.

Originality. The statistical rarity of the responses.

Elaboration. The amount of detail in the responses.

**Learning Outcomes:** Learning outcomes are statements that specify what learners will know or be able to do as a result of a learning activity. Outcomes are usually expressed as knowledge, skills, or attitudes.

**Marland Report:** The Marland report is a 1972 report to the Congress of United States of America by S. P. Marland, which contains a widely known definition of giftedness of children. It is the first national report on gifted education. One of its most compelling major findings

was: Gifted and Talented children are, in fact, deprived and can suffer psychological damage and permanent impairment of their abilities to function well which is equal to or greater than the similar deprivation suffered by any other population with special needs served by the Office of Education.

**Multiple Intelligences:** The multiple intelligence theory was created and shared by Howard Gardiner in his 1983 book *Frames of Mind: The Theory of Multiple Intelligences*. Rather than seeing intelligence as dominated by a single general ability, Howard Gardner proposed in this model that intelligence will show in eight abilities: musical-rhythmic, visual- spacial, verbal-linguistic, logical-mathematical, bodily-kinesthetic, interpersonal, intrapersonal, and naturalistic.

**Pedagogy:** Pedagogy is the discipline that deals with the theory and practice of education and is concerned with how best to teach.

**Stanford Binet Intelligence Test:** The Stanford–Binet Intelligence Scales (or more commonly the Stanford-Binet) is an individually administered intelligence test.

# **Chapter 1**

## **INTRODUCTION**

### **Background to this study**

This introduction chapter will describe context and state the purpose within a perceived problem highlighting the significance of this study. The context of a perceived growing tension for high ability learners will be described in the United Arab Emirates, within the Abu Dhabi Education system, within education for girls in the United Arab Emirates and finally within a specific UAE government school I was working in.

The Future Problem Solving programme, which is the layer of change I am investigating will be explained within an international perspective then positioned within a local United Arab Emirates (UAE) lens. Issues for high ability learners within the local UAE learning environment will be described. Tensions that appear to have an impact upon the purpose of this study are underachievement, diverse international teacher backgrounds and the growing impetus given to developing creativity within an emerging education system.

#### **Statement of the Problem**

If educators fail to understand their needs, gifted children can be at risk of academic underachievement, social isolation and depression, potentially resulting in a loss to the whole of society because of unrealized potential and contributions (Moltzen, 2004). Boredom and inappropriate behaviors may result if these needs are not addressed through constant mental stimulation (Delisle & Galbraith, 2002; Piechowski, 1991).

Lack of student engagement and motivation appeared to be indicators of a growing tension for some of the high ability learners in this girls' school and a common teacher reflection in many local Abu Dhabi schools. Inconsistent attendance and poor engagement were observed by school leaders and acknowledged as possible student expressions of frustration and secondary outcomes in response to learning experiences that seemed not to offer creative opportunities. Some parent communication and teachers' reflections stated that they did not know how to engage their high ability girls positively in learning. Programmes specifically targeting creativity for high ability students were yet to be sourced locally at a time when creativity was under the spotlight in education policy and documents nationally. It became obvious that this tension was felt by all concerned with the education journey of the high ability participating students.

#### **1.1.1 Purpose of the study**

In three decades of experience as a teacher, educational leader and coach for teachers, my observations show creativity is not commonly given the respect it deserves. Creative gifted

learners who attempt to exercise their an innate creative skill of fluency with a flow of many ideas are told to ‘let others speak; wait your turn’. Flexible thinkers who naturally use the ideas of other learners to build their own thoughts are rewarded with a negative teacher response to ‘stop using other people’s ideas.’ Skilled speakers and writers who are successful elaborators at an early age are given word counts and soon realize elaborated story telling is not valued as much as being succinct in the pressure of immediacy in what may feel like ‘push button’ learning environments. Abstract thinkers who thrive when engaged in analyzing and solving complex problems appear to be offered very little opportunity to find multiple meanings within the context of their classroom learning. Then there are students who I have observed trying to use the most at risk element of creativity, originality. It appears that the few children who maintain the original lens all children appear to start with can be perceived ‘weird’ for their unique expressions and interpretations of the world they experience daily. Original thinkers can become crystalized in their solo world, where they may be the only person who accepts and values their unique ideas. My own observations identify mental health risk can be high for creative gifted learners. Investigating the potential to develop creativity and make the most of the natural human urge to explore the world creatively within school learning might serve to resolve some of these issues for high ability learners within this UAE environment and beyond.

The purpose of this study therefore was to investigate the development of creativity for students participating in the Future Problem Solving programme in an attempt to resolve growing tensions and deliver positive opportunity for changes in attainment for high ability students. The unique educational context of Future Problem Solving within the United Arab Emirates has not previously been investigated and may offer local research findings that are relevant and appropriate to this rapidly evolving education environment.

As a classroom teacher and professional development leader within this school I was interested in questioning how creative skills might relate to successful thinking processes for Grades 6-9 high ability female students in this English second language learning environment. Could improving creativity as applied in the Future Problem Solving teaching methods that focus on the creative skills of fluency, originality and elaboration, flexibility identified in resistance to premature closure and abstractness of titles, improve engagement for some of these ‘smart girls’? Future study might investigate if enhancing these creative skills could serve to build a more transparent link for educators to view strengthening creativity as a resource to improve academic growth. The specific creativity elements mentioned above will be further explained in Chapter 3 Methodology.

## **1.2. Context for this study**

The following section positions this study in the United Arab Emirates, within the Abu Dhabi Education system, within education for girls in the United Arab Emirates and finally within a specific government school's involvement in the Future Problem Solving Programme.

### **1.2.1 Setting the scene for change within Abu Dhabi and United Arab Emirates Education**

Al Ain City where this case study was conducted is a city within the Emirate of Abu Dhabi. Divided gender placement and roles are the norm within the UAE culture and so schools are predominately single sex. The education system focus on English Language development is relatively new. The Abu Dhabi Education Council aimed to lead education reform replacing rote instruction with a new curriculum and education methods that lead students into creative and independent thinkers. English language education is integrated into other subjects such as Mathematics and Science. The higher functioning mental ability of creativity is a major focus in this study and is a valuable resource recognized in the UAE. Evidence of this priority is seen in recent national Education vision statements and policy documents. These are further explored in Chapter 2 Literature review.

### **1.2.2 Setting the scene for change for girls' education within the United Arab Emirates (UAE)**

The context of this study is within a girls' school. The UAE's commitment to empowering women through education is evident in the high levels of achievement in female education. This is the result of the promotion and encouragement of women's education by state, school and family. However, high expectation for girls' education is identified as a source of tension by some high ability students in many schools I visited in my role as trainer and adviser. High ability students frequently stated they struggled to find motivation to show their full potential in learning environments that were not creatively stimulating.

### **1.2.3 Setting the scene for developing creativity in education in the United Arab Emirates**

Over the last one and a half decades the educational environment in Abu Dhabi Schools has become an important issue in the UAE. Under the Minister of Higher Education Sheikh Nahyan's leadership in 2004 educational reform recognized the public education system was in crisis due to dated learning content and teaching methods. In the past a typical UAE classroom offered little opportunity for creative thinking within a predominately rote learning approach. A national strategy for enhancing creativity in schools was introduced under the approach of 'Discovery Learning' with a focus on creativity to encourage divergent thinking in learners. Previously convergent thinking in UAE classes appeared not to motivate creativity in learners.

#### 1.2.4 The Abu Dhabi School Model creativity alignment to Future Problem Solving

ADEC states ‘innovation provides the key to our future’ in their Education First (2015) publication distributed to teachers, students and parents. They describe innovative creative processes in which ‘each of us explores and discovers our unique abilities to create new solutions.’ This emphasis on original thinking asks educators to use discovery learning in innovative creative teaching practices to ‘strengthen our national identity and enforce our heritage’. However, at the time of this study specific learning activities were yet to be resourced to support the development of these innovative creative processes with teachers and students.

The Abu Dhabi School Model which the participating school worked under, emphasizes environmental conditions and skills within classrooms that can facilitate creativity: ***Collaboration, Communication, Critical Thinking and Creativity***. Future Problem Solving Global Issues programme offers students opportunity to work collaboratively in teams of four through a 6 Step Process: Identifying Problems, Selecting an Underlying Problem, Describing Multiple Solutions, Creating Criteria to judge their solutions and selecting the most effective solution which in the final step is elaborated as an action plan that will undoubtedly solve the underlying problem in Step 2. The Abu Dhabi School Model signposts for creativity: ***Collaboration, Communication, Critical Thinking and Creativity*** appear also to be embedded within the international problem solving programme of Future Problem Solving.

#### 1.2.5 Setting the scene for developing creativity within the participating school

The participating Abu Dhabi Education Council Arabic Cycle 2 (Grades 6-9) Girls school was my teaching and learning environment for 4 years. Typically the daily learning context for the students is a rotation through seven 45minute curriculum lessons each day. Three of these are delivered in English; English, Math and Science. All students are native Arabic speakers within Arabic multi-national mixed ability and single gender female classes. Exposure to learning English language varies outside of the school environment. Some are emerging while all others are developing. Initial classroom observations by school leaders showed no students were as fluent in English as they appeared to be in Arabic.

Challenges identified within this school are typical of those reported on by ADEC in the 2015 Draft Framework for Gifted and Talented Education current state assessment. Many teachers were reported to lack training and appear to be unqualified to identify or meet the differentiated learning needs of high ability students. At the time of this study no formal professional development plans were in place to address this. However, ADEC’s expectation to develop creativity within all classrooms offered opportunity for educators to source international

programmes that may provide the conditions and environments that could lead to creative expressions.

### **1.3 Identifying challenges for Gifted and Talented Education**

#### **1.3.1 Evolving changes within the UAE education climate for Gifted and Talented learners**

The focus in this study involves participants who are identified and described as high ability as Gifted and Talented identification processes were still to be confirmed at the time of the study in the participating school. Criteria for selecting participants for this study is described in Chapter 3 Methodology.

The daily sound of construction in this new country is echoed in the evolving professional banter as new educational structures and strategies are sourced from many corners of the world. There is a sense of flying the plane while it is being built behind you. Teachers express confusion from the constant flow and clutter of international educational strategies. The unique needs of Gifted and Talented students and in particular creativity development for high ability learners, can be marginalized out of focus in professional pre-service and in- service training for teachers.

#### **1.3.2 Why investigate creativity?**

New signposts within the terminology in education documents: innovation, discovery and creativity appear to be under a mystical cloud. Commonly asked questions at teacher development training and policy evaluation level are: What are these signposts, where do they lead and how can they impact on academic attainment? This research aims to address such questions within the context of the Future Problem Solving Programme's impact on developing creativity for high ability learners.

#### **1.3.3 Future Problem Solving and Creativity**

Future Problem Solving is the lens through which creativity was expressed and observed in this study. The choice to investigate Future Problem's Solving's impact on developing creativity and possibly improving access to other curriculum content came from my observations as a coach of Future Problem Solving for twenty-five years in New Zealand and in the UAE. In this time I have observed both coaches and students involved with Future Problem Solving go creatively beyond assumptions to solve real life problems set in the future but grounded in reality now. Specific skills and content appear to positively enable creative expression and lead to strong academic attainment for Future Problem Solving students compared to non- Future Problem Solving students. However, I intend to formalise these impressions with robust research methods to investigate and make purposeful conclusions on my

assumptions that students learning in Future Problem Solving do develop creativity and use this to access curriculum more successfully than students not learning in Future Problem Solving.

#### 1.3.4 Future Problem Solving learning environment.

Students involved in Future Problem Solving work collaboratively through six steps of the Future Problem Solving learning model as they creatively demonstrate their understanding of how the topic, problems and solutions would impact future society. Teams of 4 students progress through three stages of the Future Problem Solving model.

The first stage in the Future Problem Solving teaching model is all about securing understanding of the problem. This understanding develops as students share the task of researching the topic, reading and analyzing the future scene. This future scene is a one page future scenario that takes an existing global issue and adds futuristic elements. Topics have a wide range and can be linked to other curriculum content and skills as they offer 16 categories of thinking such as scientific, economic, environmental psychological, ethical and physical health contexts. In Step 1 of this first understanding stage teams of four students will apply creative methods such as brainstorming, mind-mapping while comparing the information to a variety of categories to identify 16 key challenges in the future scene and describe which one challenge is clearly the underlying problem. The second stage is all about generating creative and effective solutions to this key Underlying Problem. The team will generate and select criteria to judge their solutions from Step 3. After applying their criteria in their final step students select the best solution to the underlying problem and develop a comprehensive action plan that shows explicitly how the underlying problem will be solved.

Key creativity skills embedded throughout all six steps of the Future Problem Solving programme are the focus categories for measuring creativity in this study. Their value and application will be further explained in Chapter 3 Methodology. **Fluency** is measured by the number of ideas produced by an individual or team; **originality** is measured by the unique uncommon responses; **elaboration** as evidenced in the detail and embellishment in each idea; **abstractness of titles** measures the ability to sense the wider picture and finally **resistance to premature** closure measures the ability to keep their thinking open while considering a variety of information and can be described as flexible thinking.

#### 1.3.5 Underachievement

Evidence of underachievement can be seen when students loose interest, motivation and commitment to performing well, or have a fear of failure (Assouline & Colangelo, 2000; McCoach & Siegle, 2003; Colangelo et al, 2003). Educators and parents assume that students

earning good grades and score highly on standardized tests are learning. However, many high ability students in the participating school stated they that had mastered the content of learning prior to instruction leading to reduced motivation and engagement. Underachievement appeared to be evident.

The lack of preparedness of teachers to identify and teach high ability learners is acknowledged as a major challenge within ADEC's Framework for Gifted and Talented (May 26 2015). The reality is that few schools have targeted training programmes for teachers. Most schools do not have a framework or methodology to systematically identify the gifted and talented nor to deliver effective appropriate programmes that enable development of creativity. I believe this could contribute to a pattern of underachievement. It would seem this research into the development of creativity for high ability learners within Future Problem Solving could add to the emerging priority given to provide appropriately for their diverse learning needs and possibly counteract an identified pattern of underachievement.

#### **1.3.6 Teacher assumptions identified as initial barriers to developing creativity for high ability English language learners.**

An assumption was expressed within the teacher training of this school and professional development environment for teachers in Abu Dhabi that academic, social and affective dimensions of the Arabic gifted students were masked by their limited ability to fluently express their creative potential in English. Investigating evidence of creativity within the learning characteristics and traits of English Language Learners is relevant in this Arabic school. This research might challenge assumptions that high ability students are limited to show their potential to think and express their thinking creatively as they learn within a new language.

### **1.4 Significance of this study**

#### **1.4.1 Contemporary value given to creativity development in education.**

Bloom (1994) stated “with the explosion of knowledge that has taken place during the past years, the ability to use higher mental processes has assumed prime importance” (P.10). With such rapid advances the demands to understand and cultivate creative thinkers in education has become an intense focus in schools internationally and more recently in the United Arab Emirates.

The higher functioning mental ability of creativity is a valuable resource recognized in the UAE. This is evident in its recent priority within Education vision and policy documents. This pilot study could lead to further investigations into the possible role of Future Problem Solving.

Personal research on this topic in the future could be guided by this pilot study.

#### **1.4.2 Why explore creativity within this school?**

Inspiration to explore the potential for developing creativity in Gifted and Talented Arabic learners and observe the impact this may have on other learning came from the high ability students themselves in this Cycle 2, (Grades 6-9) Girls' school. The students appeared to be transitioning between two, sometimes more languages and two cultures, Arabic and Western. Daily learning rotations with Arabic and English first language speaking teachers served as a shaky bridge as students and teachers did their best with so few resources or training for developing high ability students.

The classroom setting in this participating school was at times the environment where tensions were played out as hallmark behaviours of inferiority, dissatisfaction, inadequacy and anxiety of inner conflict between "what is" and "what ought to be". Dabrowski's Theory of Positive Disintegration (1966), highlights that gifted creative individuals experience "the demands and expectations of their environment which are commonly incompatible with their higher value structure." p.53. Observations in classrooms within my role as a school leader identified a trend with some creative gifted and high ability students who appeared to become bored with and abandoned tasks quickly, as they filtered through learning that did not satisfy their purpose. This conflict and tension for the intellectually gifted and creative students led me to consider the following focus research questions in my investigation.

#### **Research Questions**

1. Can we improve the creative potential of high ability girls by offering the creative skills in Future Problem Solving?
2. Could Future Problem Solving creative problem solving skills offer opportunity for high ability students to access and engage more effectively in other curriculum content?

## Chapter 2

### Literature Review

#### Chapter Introduction

The following literature review will consider the main issues surrounding creativity and Gifted and Talented learning for girls in the UAE. Although Gifted and Talented Education is not the focus in this study some participants in the study were described by teachers as Gifted or Talented. However at the time of this study robust identification processes were not offered to schools in the Abu Dhabi region for effectively identifying or teaching these students. Both participating groups are a mix of students who are high ability and some who are described by the school as Gifted and talented.

In this review I will focus on (a) Gifted and Talented traits and characteristics to identify high ability students considered for identification and participation in the Future Problem Solving withdrawal programme; (b) identifying creative skills within the Future Problem Solving and the Abu Dhabi School Model which the participating school works with; (c) the impact on creativity of English language learners such as the Arabic student participants working in an English medium environment; (d) theoretical frameworks that are used to inform this research and frame understandings of creativity.

The international body of literature referring to Gifted and Talented education and creativity is expansive, but the local UAE research landscape in these areas of education is sparse. There is no research into the impact of creativity in Future Problem Solving being transferred into other curriculum areas. There is also no research in the UAE on the impact of the specific creative skills in the Future Problem Solving programme: *Fluency* as measured by the number of ideas produced by individual or team; *originality* measured by the unique uncommon responses; *elaboration* as in the detail and embellishment in each idea; Flexibility as seen in *abstractness of titles* measuring the ability to sense the wider picture and finally *resistance to premature closure* measuring the ability to keep your thinking open while considering a variety of information.

What is interesting and specific about the learners in this study is that they are Arabic English second language learners in a mixed Arabic and English medium education. This will also be presented and discussed within relevant research in terms of the potential impact English language learning may have on developing creativity for these high ability learners.

## **2.1 What is Gifted and Talented?**

As stated this study does not focus upon Gifted and Talented specifically due to the weak identification processes of these learners within the participating school. However as some of the high ability students were described as Gifted and Talented within the participating school environment, it is worthwhile describing the various definitions applied in other environments. These definitions may have an impact upon the descriptions offered by the participating school for some of the high ability participants.

Throughout history the success of a society relates strongly to identifying the needs and values that would be well served by those members who display superior ability. Past and current definitions for these high ability learners will be presented and analyzed for their usefulness in meeting the specific needs within this educational environment of the UAE.

## **2.2 Selecting Terms in Gifted Education**

The variety of terms offered internationally, create a predicament when researching and reporting in the field of high ability learners. Terms used by ADEC are 'high potential, exceptional and advanced'. In New Zealand where I have gained most of my teaching experience, terms have included: children with special abilities, students with high potential, exceptional, gifted and talented. Since America's Marland Report (1972) was released, international use of 'gifted and talented' is the favoured term internationally. Although it is a term favoured by educators in the UAE also, I have chosen not to use it in this study to describe those high ability or exceptional students within this study who are outstanding in one or more areas of learning. This is due to the lack of robust identification processes in place within the participating school at the time of the study. For this reason I will refer to the participants as high ability. The participating groups will be further described later in Chapter 3 Methodology.

## **2.3 Defining Gifted and Talented**

Numerous definitions for gifted and talented have surfaced over the last century that differ significantly. When analyzing existing definitions, a concept continuum which offers four categories of definitions is helpful: 1. biological to environmental (nature/nurture); 2, conservative to liberal; 3, performance to potential; and 4, single to multi-category.

### **2.3.1 Biological to Environmental (nature/nurture) Definitions**

Biological to Environmental definitions describe performance being related to either innate biological or environmental factors. Clark (2002) describes advanced and accelerated brain function which includes physical sensing, cognition, emotion and intuition. Tannenbaum (1983) supports the relevance of environment as an external factor stating "Giftedness requires social

context that enables it to mature" (p.54). The complementary dynamics and interplay of both innate biological and environmental factors is recognized in this study.

### **2.3.2 Conservative to Liberal Definitions**

Conservative definitions in the early 1900's limited gifted identification to a small section of the population scoring highly on one criteria with intelligence tests such as the Stanford-Binet intelligence test being a common measurement tool. Renzulli's definition of giftedness (1978) represents a more inclusive, wider and multi-faceted view. He states gifted behavior can be identified when there is an interaction between three clusters of human traits: above-average general and/or specific abilities, high levels of task commitment (motivation) and high levels of creativity. This more liberal approach applied in this research assisted identification of high ability participants and supports the multi-faceted definition from ADEC which this government school operates under.

### **2.3.3 Performance to Potential Definitions**

Gagné (1985, 1999) recognizes potential as he describes the interplay between internal biological factors and the environment, which may transform talent into demonstrated gifted performance. This supports Tannenbaum's recognition of environment being important to transform talent into a gift. Gagné describes gifted learners who may or may not present to be high-achievers as they may be disengaged and under-achieving but have high potential. Disengagement was a common theme identified when describing high ability students I was meeting in many local schools.

### **2.3.4 Single to Multi-category definitions**

The Federal Government in America released the Marland report (1972) which was the first recognition that abilities of students can be in multiple disciplines. Gardner (1993) Multiple Intelligence theory also supports human ability can be demonstrated in a unique blend of multiple intelligences that may differ in blend and strength to demonstrate capacity. These multiple intelligences are identified as: Intellectual ability, Subject-specific aptitude (e.g. science or math), Social maturity and leadership, Mechanical/technical/technological ingenuity, Visual and performing arts (e.g. art, theatre, recitation), Psychomotor ability (e.g. dance or sport).

### **2.3.5 Abu Dhabi Education Council Definition**

The ADEC definition, which this participating school aimed to work with in developing their own definition supports a multi-faceted identification similar to Gardner, acknowledging multiple disciplines. However, in the ADEC definition the absence of creative or productive thinking as an indicator of giftedness, is included in the Marland report (1972). This study seeks

to recognize the importance of creativity as a possible indicator of giftedness, which may strengthen attainment if developed.

ADEC's executive summary on Gifted and Talented (2015) describes the gifted or talented student as so exceptional or advanced that they require special provision to meet their educational needs in the general education classrooms. However, the report also states the current teaching workforce within ADEC schools is not equipped to identify or cater for the special learning needs of gifted and talented students. In describing a lack of identification and adequate learning programmes for Gifted and Talented learners the executive summary leads me in the direction of this current study to investigate a programme that may be capable of filling this critical education gap for both teachers and high ability students. The special provision of Future Problem Solving is highly resourced by specialist international educators and supports a multi-faceted approach to co-operative learning for high ability learners.

#### **2.3.6 The Participating School Definition of Gifted and Talented**

Parameters within a multi- category approach aligning with Gagné, Renzulli and Gardner were introduced in developing the participating school's definition. This definition was formulated in consultation with school leaders, teachers, parents and students. Analysis of international definitions and the Abu Dhabi School Model vision, led myself and the participating school's central descriptions of giftedness to students identified with high ability in: motivation, effective communication, intense and sometimes unusual interests, collaborative and independent problem solving strategies, creativity, expansive memory, inquisitive, insightful, strong logical reasoning and ability to share their humour. Students were identified considering their unique blends of these characteristics. Professional learning for teachers to successfully identify Gifted and Talented students from the school definition was not complete at the time of this study. Each of the two participating groups had equal mixes of students who were identified as high ability and possibly Gifted and Talented.

#### **2.4. Defining Creativity?**

Creativity is the main focus within this study. Creativity is a complex term that certainly does not yield to a single definition. Treffinger (1996) reviewed and presented 100 published definitions for creativity involving cognitive abilities, personality characteristics, social and interpersonal factors. Complexity is apparent in the quantity of descriptions as criteria for identification of creative behaviours may differ in various environments. In ancient times creativity theories were linked to some sort of divine inspiration. During the Renaissance period creativity was beginning to be linked to a person's own ability which followed the leading

intellectual individuals such as Leonardo Di Vinci. 19<sup>th</sup> Century Darwinism linked creativity to genius and impulse. The 20<sup>th</sup> century saw creativity researchers developing theories that categorize recognizable characteristics of creativity.

This review will mainly focus on theories used in education and will seek to show why the creative index score and creative skills in the Torrance Test for Creative Thinking were chosen as a purposeful quantitative measurement tool to identify changes in creative output for participating students. Creativity skills development within the process of learning in English as a second language will also be discussed.

#### **2.4.1 Creativity Focus in Education**

Since the 1950's what fosters creativity in learners is regarded highly in most education environments and matches transformations in our changed perspectives of academic attainment and learning. More recently economic emphasis on innovation has raised the profile of creativity in education. Being creative as seen in innovation can lead to growth in economic value of a person or community.

Prior to 1960 creative thinking was measured primarily within intelligence quotient (IQ) testing. In the 1990's a response to the developments in social psychology which built on Guilford's (1950) earlier inclusive theory acknowledged creativity in ordinary people and not as previously seen the domain of a few. In education research this democratic theory of creativity supports that all students can be creative. Gardner (1993) refined his description of high creativity as "the achievement of something remarkable and new...the kinds of things that people do that change the world".

While multi-faceted descriptions of creativity such as Gardner have evolved the most common elements in many descriptions still value the presence of originality and usefulness of ideas. Edward De Bono led the practical approach to theorizing about creativity in education to include lateral thinking and multiple viewpoints as new ideas are processed. Diversity and flexible learning options are well recognized to fuel creativity development. De Bono's theory is widely valued in classrooms as it supports an inclusive approach to developing creativity such as Guilford's theory acknowledging creativity in all people.

Sternberg (2004) proposes creativity and problem solving are closely intertwined as he states "generating ideas, analytical intelligence in evaluating the quality of these ideas, practical intelligence in implementing the ideas and convincing others to value and follow the ideas, and wisdom to ensure that the decisions and their implementation is for the common good of

all stake holders.” Such descriptions match well with the processes students work through in the Future Problem Solving programme I am investigating the impact of in this study.

Isaksen, Dorval, & Treffinger (2011) describe generating options as creative thinking and focusing options is critical thinking and these combine to make effective problem solving. They build on Guilford’s inclusive theory by further stating that creativity is present in all people and can be nurtured or enhanced through deliberate educational efforts.

### **Creativity Theories that Influence Education in this Study**

Two main categories of investigation to define creativity developed since the 1950’s were psychometric and psychodynamic. E. Paul Torrance is the leading theorist of the psychometric theory that studies the link between creativity and intelligence. The founding theorist for psychodynamic analysis of creativity was Sigmund Freud who stated creativity arises from the tension between conscious reality and unconscious drives.

#### **2.5.1 Guilford**

Guilford’s Presidential address in America (1950) expressed the need for research on creativity. Guilford’s tool to measure creative divergent thinking (1967) developed into Torrance’s Test for Creative Thinking (1974). This test is the precursor of the measurement test used in this study. Torrance’s inclusive theory further opened educators’ minds to consider creativity can be seen and nurtured in all people.

#### **2.5.2 Treffinger**

Treffinger et al. (2002) state research in the area of understanding creativity is divided into three areas: (a) cognitive characteristics, (b) personality traits and (c) biographical events. Cognitive Characteristics in creativity are described by Guilford(1967),Torrance (1962), Treffinger, et al (2000), to guide identification of intellectual processes such as reasoning or problem solving. More recently educators assigned to developing effective learning environments and resources for all learners are guided by research into nurturing and developing creative cognitive processes rather than only measuring the level of creativity.

The second category applied to identify creativity is Personality Traits, which Treffinger et al. state will influence how a learner will engage and apply their intellectual characteristics. The third and final category is Biographical Events which describes experiences in our lives that may lead to creative expression. Treffinger et al. (2002) state learning about how creativity is manifested allows strengths to be recognized and creative productivity to possibly strengthen. This current study aims to observe possible changes in creative cognitive characteristics for participants involved in the Future Problem Solving programme as measured in the TTCT and

recognize possible strengths of creative productivity.

### 2.5.3 Renzulli

Renzulli's (1978) Three Ring Conception of Giftedness theorizes that giftedness is identified as high level creative production caused by three interlocking clusters of: above average ability, task commitment, and creativity.



Renzulli's Three Ring Conception of Giftedness (1978)

When describing task commitment in gifted learners, Renzulli includes characteristics such as perseverance, endurance, self-confidence and perceptiveness. Above average abilities are described by Renzulli (1978) as general abilities such as processing information, integrating experiences and abstract thinking or specific abilities such as acquiring knowledge or performing a specific activity. Creativity is described by Renzulli as; fluency, flexibility, original thinking, being open to experience, sensitivity to stimulation and a willingness to take risks. Renzulli (1978) states when all three rings are applied by a learner high achievement or gifted behaviour will be observed.

### 2.5.4 E. Paul Torrance, Founder of the Future Problem Solving Programme

E. Paul Torrance founded the Future Problem Solving Programme in the 1970's as a programme in which students are taught to apply creative processes to maximize their learning within a problem - solving context. The learning programme is recognised internationally and will be identified as FPS in this study. This creative skills set taught in this FPS programme is the focus intervention being investigated.

Torrance was an early pioneer in research on creativity in education. From the early 1960s, Torrance called for a heightened interest in 'creative giftedness' He stated 'developing creativity is important from the standpoint of personality development and mental health; it contributes importantly to the acquisition of information...and is essential in the application of knowledge to daily personal and professional problems' (Torrance, 1962, p32).

Torrance stated FPS emerged in the 1970s from the fact that he "sensed a need for creatively gifted youngsters to develop richer images of the future and to expand their creativity"

(Torrance, 1994, p. 33). He designed and developed FPS for “students currently in differentiated programmes for the gifted who like to think about the future and believe that there is much that they can do to change it and to shape it.” (1978, p. 75). Skills in FPS that Torrance considered “uniquely fitted to the needs and characteristics of gifted and talented students” (p.77) included: problem-solving skills (where he found that gifted students typically lagged behind others), improvement of teamwork skills, enlarging and enriching images of the future and interdisciplinary skills such as reasoning and communication.

## **2.6 Recording and Assessing Creativity**

As I consider various approaches in literature that may be applied to assess creativity I question if creativity can in fact be measured. In comparing various tools already being applied I have considered the most effective for my purpose to measure change in creative output for students learning within FPS and if those changes could possibly be linked to more positive outcomes in their other learning areas.

Because there are many definitions of creativity identifying creativity assessment and measurement approaches can involve different lenses. Interpreting criteria for recording and assessing creativity changes or developments can be problematic. What some teachers see as original others do not. However, specific creative characteristics have been identified, which can guide us with quantitative measurements by Treffinger et al. (2002), who describe implications for assessment where creativity has been identified and assessed through 4 categories that are supported by previous research into measuring creativity;

1. Personality traits, (Fromm (1959), Khatena (1973) and MacKinnon (1978))
2. Tests for specific creative thinking or problem solving aptitude (Gordon (1961), Guilford (1959), Mednick(1962), Torrance (1962), Treffinger et al(2002).
3. The environment that inhibits or nurtures creativity, (Maslow (1976), Rogers (1959)
4. Evaluating products or accomplishments (Gardner (1993), Khatena (1973) or interactions between learners’ process and outcomes (Amabile (1983), Rhodes) (1961).

In this current study quantitative measures and qualitative analysis are given to teacher responses in the English Language Learner Characteristics questionnaire, which specifically considers personality traits and the environment that inhibits or nurtures creativity. The Torrance Test of Creative Thinking offers quantitative measures to specific characteristics assessing creative thinking skills and problem solving that link to real life activities. The Future Problem Solving learning environment evaluates creativity through a specific product and

accomplishment as teams complete a six -step booklet and receive both quantitative and qualitative evaluation from external evaluators.

Scholastic Testing Service Inc. and Future Problem Solving Program International initiated a collaborative longitudinal study (2010), utilizing the Torrance Tests of Creative Thinking (TTCT) to evaluate the impact of Future Problem Solving on learners. This longitudinal study involved Grade 6-9 Future Problem Solvers and non- Future Problem Solvers from the same grades and same schools with a wait period of three years between first and second testing. In this programme evaluation it was significant to see Future Problem Solving students showing higher increases than the non- students Future Problem Solving on each of the standard scores and creativity indices. A point of difference in this current study is the participating students are all Arabic English second language learners working in an emerging education climate subject to rapid and constant change in content and process. A second point of difference is that the students are not all identified as Gifted and Talented but rather are a mix of high ability students with various learning characteristics described in Chapter 3 Methodology.

#### **2.6.1 Connecting Creativity Assessment Rationale to Future Problem Solving**

In an attempt to consider existing creativity assessment tools I have found Treffinger et al. (2002) rationale for developing categories of creative characteristics with specific observable traits connects well to those applied in the Future Problem Solving Programme learning activities I am investigating and attempting to measure in this study. Treffinger et al. (2002) collaborated through the American National Research Center to produce a creativity assessment guide for educators on the Gifted and Talented. They clustered a final list of observable characteristics into four categories: Generating Ideas, Digging Deeper Into Ideas, Openness and Courage to Explore Ideas and Listening to Ones' "Inner Voice". Each category is matched with characteristics that may be identified and assessed for creative output. The following descriptions explore the connection between the Future Problem Solving programme and Treffinger et al. creativity assessment guide.

Treffinger et al.'s (2002) first creativity assessment category Generating Ideas matches directly to the problem and solution finding activities in Future Problem Solving. Cognitive characteristics recognized as divergent or creative thinking when generating ideas in Treffinger's creativity assessment guide (2002) which are also an asset in Future Problem Solving are: fluency, flexibility, elaboration and metaphorical thinking when making connections. Treffinger et al. (2002) state it is convergent critical thinking that is recognized in

the second category Digging Deeper Into Ideas. Here there are observable characteristics of analyzing, synthesizing, re-organizing or re-defining, evaluating, seeing relationships, bringing order and preferring or understanding ambiguity. Students strong in these characteristics are improvement oriented which could require flexible thinking skills. Again these skills are applied in all of the Future Problem Solving 6 Step activities. Treffinger et al. state the third category Openness and Courage to Explore Ideas, connects to a learners attitude, self-confidence, experiences and interests with characteristics of problem sensitivity, aesthetic sensitivity, curiosity, sense of humour, tenacity, openness to experience, emotional sensitivity, adaptability, intuition, willingness to grow, unwillingness to accept authoritarian critical examination or opposites. The learning characteristics and traits in this third category can be a challenge for those gifted learners in Future Problem Solving with weaker interpersonal learning skills. Future Problem Solving activities are offered in a collaborative learning environment within teams of 4 and both individual and team success relies significantly on these characteristics to be open to both your own and the ideas of others. Students with strong communication and interpersonal skills such as Treffinger's third category identifies, appear to thrive immediately within the Future Problem Solving learning climate. This is not to say that a weakness in the interpersonal learning skills of being open to the ideas of others cannot be improved within the Future Problem Solving learning activities.

The final category in Treffinger et al. guide for assessing creativity is Listening to One's 'Inner Voice' evident in characteristics of persistence or perseverance, awareness of creativeness, self-direction, introspective thinking, energy and work ethic. My observations over many years of coaching Future Problem Solving, suggest that students who have strength in these 'Inner Voice' characteristics achieve significant success both in the programme and in their wider curriculum content learning.

Treffinger et al. (2002) make a clear distinction in their Assessment for Creativity Guide (2002) between assessment and measurement of creativity. They advise that due to the complex and multi-dimensional nature of creativity, no single assessment tool will fully capture changes in creativity output. In support of this multi-dimensional description I have chosen multiple measurement tools to identify changes for creative output of students learning in a specific programme, Future Problem Solving that claims to develop creativity. The research design will include an international benchmarking Torrance test for creativity and questionnaires with a pre-and post-test time frame I will describe quantitative measures for, further in Chapter 3, Methodology.

## **2.7 Torrance Test of Creative Thinking (TTCT)**

The streamlined version of the TTCT (Torrance Test of Creative Thinking) figural forms is one quantitative data source I used in this current study to gain international benchmarking. This creativity assessment tool was chosen because the activities offered and measured in the test are described by Torrance (2000) as models and analogies of creative thinking processes required by daily life. Torrance states that although these abilities are not the only indicators of creative behaviour the high degree of their presence in the test may increase the chances of creative behaviour within the Future Problem Solving programme and other classes.

### **2.7.1 Rationale for the Measurement Activities in TTCT**

E. Paul Torrance's research review (2000) on the Torrance Tests of Creative Thinking Figural and verbal forms A and B, identifies the term 'creative abilities' as used in the Torrance Tests of Creative Thinking to refer to a group of mental abilities commonly predominant or crucial in creative thinking: fluency, flexibility, originality and elaboration. The Torrance Tests of Creative Thinking figural test applied as a quantitative measure in this study uses three picture based exercises to assess five mental characteristics and thirteen additional creative strengths. Descriptions of the three picture based activities and procedures for scoring and analyzing these will be further explained in Chapter 3 Methodology.

Critics of the Torrance Tests of Creative Thinking hesitate to use it because of the time and energy required to master the standardized scoring. I have employed the Ashton Scholastic team, an international body who administer tests for institutions and organizations to assess and report on the TTCT performance of the participants. This also strengthens objectivity in the study.

## **2.8 Creative Characteristics of English Language Learners that may Impact on this Study.**

My involvement in education at various levels over three decades, leads me to support the view that the process of education is a deeply linguistic one. I have often observed language skills function as the most memorable cause for exclusion from learning. Particularly fitting to the motivation in this study is the Iowa Department of Education description of underachievement for second language learners (2005) as "A person who has difficulty speaking, reading, writing or understanding English, which denies him/her the opportunity to learn effectively in classes where instruction is in English' p9. The Arabic first language background of English language learners who are identified as high ability in this study provides an academic challenge where proficiency in English language only classrooms leads to probability of success in reading, writing, listening and speaking in three core subjects; English, Maths and Science. In the UAE

these curricula are all taught in English with instruction focus directed at improving English proficiency. The high ability participating English language learners in this current study are reported by their teachers to all demonstrate strong problem -solving characteristics compared to their peers and similar limited English language skills to most of their peers. It is the interplay of specific creative learning behaviours and characteristics that I am interested in and describe with quantitative measures and qualitative description in Chapter 3, Methodology and Results Chapter 4.

## **2.9 Action Research Frameworks Applied within this Study**

While traditional forms of educational research enquire into and report on teaching and learning from a perspective outside the school setting, action research is initiated and undertaken by practitioners and other participants from inside the school setting (Noffke & Somekh, 2005).

There are different ideological orientations to educational Action Research, each embodying different values and placing different emphasis on the role and purpose of the practitioner- researcher. Carr and Kemmis (1986) categorize Action Research according to its concern with constructing knowledge around three cognitive interests: Technical Action Research which focuses on solving simple problems using prediction and control; Practical Action Research focuses on knowledge for purposes of improving practical judgment and practice, Critical or emancipatory Action Research which has the potential to enlighten and empower the practitioner to challenge social structures and create conditions for equality. In this current study, I am the researcher promoting practical action research as specific focus is given to opportunities I will offer in my teaching practice within the school setting I am currently working in daily.

### **2.9.1 Transformative Practitioner Action Research**

All teacher Action Research could be considered potentially transformative. Single school based studies such as this one might increase participants' knowledge, sense of worth through the development of creative skills and characteristics and teaching practice (Brennan & Noffke, 2009). This study could be considered transformative. However to be truly transformative within its own right this single study is mindful of the current UAE education environment's needs and direction for developing creativity in students. Already proposed within curriculum content and teaching practices teachers are asked to apply innovation which may impact upon any transformation developing creativity of the study content. At a time of significant change in the United Arab Emirates education climate, when teachers are expected to take up evidence-

based practice initiatives before initiating changes, the need for practitioner action research such as in this current study is strong. The steps taken in this practitioner action research will be further explained in Chapter 3, Methodology.

### **Literature Review Summary**

When defining points of reference describing gifted and talented many terms are available and applied internationally. This study applies the term high ability with the main focus upon the impact of creativity development on two purposefully selected groups of high ability learners with mixed characteristics and traits.

The Abu Dhabi Education Council reports have identified a critical gap in Gifted and Talented learning environments and the current teaching workforce is not equipped to cater for the special learning needs of these learners. Gifted and Talented students are not reported on as a separate group in this study as Gifted and Talented Education is not the focus of this study.

Diverse characteristics are widely accepted in the international perspectives identifying gifted and talented. Identification parameters showing a multi-category approach are applied within this school. Creativity is yet to be accepted as a possible trait of gifted learners and is not included in the ADEC definition.

Descriptions of creativity have a broad spectrum internationally. Democratic and inclusive theories of creativity have developed since the 1990's in response to developments in social psychology. Originality and usefulness of skills are the most common elements in descriptions of identifiable creativity.

From the 20<sup>th</sup> century, creativity researchers have developed theories that categorize recognizable characteristics of creativity. Two main categories of investigation to define creativity developed since the 1950's were psychometric and psychodynamic. E. Paul Torrance is the leading theorist of the psychometric theory that studies the link between creativity and intelligence. This current study is interested in following psychometric links between creativity development and access to academic attainment within the curriculum.

Torrance, founder of Future Problem Solving Programme International in the late 1970's, was an early pioneer in research on creativity in education. Torrance stated Future Problem Solving emerged in the 1970s from the fact that he "sensed a need for creatively gifted youngsters to develop richer images of the future and to expand their creativity" (Torrance, 1994, p. 33). No

studies have been conducted on creativity in UAE classrooms for high ability English second language learners that consider the classroom environment Future Problem Solving offers in specific creative elements.

Specific characteristics can be identified with creative skills that lead to variety in an assessment focus. Treffinger et al. (2002) make a clear distinction in their assessment for creativity guide between assessment and measurement of creativity. They advise that due to the complex and multi-dimensional nature of creativity no single assessment tool will fully capture the changes in creativity output. This study is measuring specific skills in creativity identified and taught in the Future Problem Solving Programme that could relate to other classroom learning environments.

The streamlined version of the TTCT (Torrance Test of Creative Thinking) figural forms A and B were applied as a quantitative measurement tool for data source in this current study to gain international benchmarking. This creativity assessment tool was chosen in this study because the activities offered and measured in the test are reported by Torrance to be closely linked to creative thinking processes observed in daily life.

English Second language learners may apply unique creative characteristics and behaviours within three categories: school, language and cultural abilities. These three categories are identified in the Galaxies of thinking and Creative Heights of Achievement Project (1986-1987). The three categories and their specific characteristics form the basis of a questionnaire for teacher respondents of participating those students who were learning in Future Problem Solving and those who did not. This is the second quantitative data -gathering tool and is aimed at supporting the primary data source in the TTCT.

I am the researcher promoting practical action research in this study as specific focus is given to changes that may evolve from opportunities I will offer in my teaching practice within the school setting I am currently working daily.

## Chapter 3

### RESEARCH METHODOLOGY

#### Chapter Introduction

Chapter 3 aims to examine and explain the research methodology supporting this study. Methods used to gather and analyze data will be described. Philosophical frameworks that guide my investigation will be examined and reported on. The relationship between theory and data will be explained in an effort to identify and explain my beliefs (ontology) and how I can determine whether there has been change or not in creativity development for the participants (epistemology). The strengths and limitations of qualitative, quantitative and mixed method research methodology will be briefly covered in an effort to explain my choice to focus on mixed methodology perspectives in this investigation.

The study focuses on an intervention for participating students involving learning within the International FPS programme. The learning environment and teaching methods for the students taking part in FPS and those not in the FPS programme will be described. Creative components of the Future Problem Solving programme that were offered daily and monitored for change through practitioner action research methodology will be described as will the learning environment where Future Problem Solving was not offered to students.

#### 3.1 Ontological and Epistemological Decisions

The design of this research is impacted upon by ontological and epistemological considerations. The epistemology in my research design is concerned with how knowledge was acquired. Basic assumptions about the relationship between perceived knowledge and reality are considered. My perceived knowledge of the impact of FPS on high ability students is gained from three decades of practical experience coaching the programme in New Zealand and in the United Arab Emirates. In this time I have observed the positive impact of Future Problem Solving and gained shared understandings of student learning, motivation, academic and creative development. A major goal of this study is to formalize this perception into reality within a mixed methodology approach. Data will be gathered over the period of a year to determine possible positive changes in assessments of creativity for those students who are involved in FPS and relating these changes in improved attainment to curriculum learning.

Ontology in any research project considers what reality is and how it is to be defined. Positivist

and Interpretive research paradigms are two contending views in defining reality. A positivist lens looks at knowledge being reality while the interpretive lens believes that knowledge is in our interpretation and shared understandings. Knowledge is acquired and reflected upon in this study through quantitative measureable data gathered on five specific creative learning categories identified through the Torrance Test for Creative as fluency, flexibility, elaboration, originality and the creative index. A cross-tabulation between two learning environments will be presented; those learning within FPS and those who were not. The numerical data will be analyzed using SPSS to make generalizations through my positivist lens. However it is within an interpretive lens that I will consider the impact of involvement in the intervention FPS has on curriculum learning and quantitative data will be interpreted qualitatively.

### **3.2 Practitioner Action Research**

Action research has clear benefits for education. Teachers can generate knowledge for improving their own classroom teaching and learning and that of their students and other teachers Carr & Kemmis, 1986; Somekh, 1995). The action I have taken in offering an intervention with targeted creative activities for the high ability girls I taught within my own daily practice may serve the purpose of improving this learning environment for both teachers and students. This single school classroom-based research might increase responding teachers' knowledge, practice and opportunity to develop creative abilities. The practitioner action research methodology I am following in this study could be considered transformative if this school considers the findings support developing more creative learning opportunities in classrooms applying Future Problem Solving content and positive learning processes. Findings of this study may be relevant in transforming the wider education field of schools in the United Arab Emirates and beyond who have identified similar teaching and learning needs for developing creativity and a lack of effective resources for engaging high ability students.

Noffke and Somekh (2005) describe three action research agendas; the *political* serves emancipatory purposes in focusing upon social changes, the *professional* involves teachers generating transferrable knowledge to improve the quality and status of the profession, the *personal* in which the teacher is regarded as a professional who investigates his or her own understandings or practices in order to develop both. This current research will have both professional and personal orientation. I am the researcher investigating my own personal understandings, practices and perceptions within the action of developing creativity for students. My professional agenda is intertwined with improving student learning outcomes (Tomal, 2003) through offering specific creativity opportunities within the Future Problem

Solving programme. This professional agenda to develop and monitor changes in creativity is one shared by the school and the Abu Dhabi Education Council whom I worked for.

The specific practitioner action research steps I have followed are described later in this chapter.

### **3.3 Personal Biography Impact**

My own personal biography in education may offer unique perception and insights gained from 25 years working with Future Problem Solving. In these years I have met many students not involved with FPS and described by their teachers as creative who become disengaged in the common curriculum. For students who experience a learning environment where little or no creative opportunities are embedded in the daily learning, mental health risks such as depression and anxiety appear to be high. The creative opportunity and cognitive challenge offered in FPS has been described by participating students as learning with opportunities that encourage them be their best creatively. However I am not proposing that FPS is the only learning environment that may offer creative learning opportunities. Care for the integral role of objectivity in this study is critical as I attempt to interpret patterns and find meaning in the quantitative data while aware that my own experience with FPS over 25 years in education is ever present.

### **3.4 Ethical Considerations**

Ethical considerations in this study are aimed at protecting the participants, the participating researcher and the credibility of the research. Research was undertaken in accordance with Abu Dhabi Education Council (ADEC) research guidelines with permission from the school Principal, who has the authority within ADEC guidelines to approve the research within her school as an ADEC representative.

The principles and values of ethical research behaviour I support include justice, safety, truthfulness, confidentiality and respect. Considerations I have made that show these principles and values are; informed consent of participants; guaranteed confidentiality of data and individuals through coding; avoidance of unnecessary deception, sensitivity to the needs and characteristics of the participants; and recognition of possible power relationships. Informed consent is considered to have been achieved if the participant knows what the study is about, understands what will be required in order to participate in the study, understands his or her level of confidentiality in the study and subsequently agrees to participate (Baker, 1999). Participants needed to be assured of the integrity and purpose of this research before they

decided whether or not to be involved. In response to the above ethical considerations I delivered several community consultation meetings informing prospective participants and their parents, teachers and school management of the scope and purpose of the study. Invitations to participate were called for at the second meeting. Written permission prior to gathering data was then obtained through use of an introductory letter (Appendix 1) and consent form for the participating students' parents and Principal (Appendices 2,3,4 and 5). Voluntary participation was embedded in the research design plan and all participants were informed that they could withdraw at any point without condemnation.

Confidentiality of all data and records was guaranteed with access restricted to myself in Al Ain City and my supervisors in Canterbury University, Christchurch. All documentation was securely stored at my homes in Al Ain City, UAE and Christchurch, New Zealand and electronic material stored on my personal computer which is password protected. These materials will be retained in this manner being used only for the purpose of this thesis, possible conference presentations and publications.

### **3.5 Mixed Methodology Limitations and Strengths**

This study has used a mixed methodology comprising both quantitative and qualitative methods. The use of a mixed method approach is more likely to add breadth, complexity, and richness to the research (Johnson & Onwuegbuzie, 2004). A mixed methodology is effective in enhancing the validity of research outcomes and can offer credibility. Burton et al. 2008 argues for the use of mixed methods research pointing out that qualitative and quantitative technique can be combined effectively to strengthen overall conclusions. The mixed methodology followed in this study will offer one main data set in the Torrance test for Creativity Test with a supporting secondary data type in the English Language Learner (ELL) questionnaire. Analysis and reporting on the data results used the SPSS programme and qualitative description to show patterns and possible changes for students learning within the Future Problem Solving Programme and those who were not.

Limitations experienced in a mixed method design could be the time and resources required to collect both sets of data if the researcher is attempting to create 'a world view' Tashakkori, A. & Teddlie. C. (2009). By 'world view' this could relate to how well this study might be generalized to a wider population of students. The identification process in which the External Measurement of Student Measurement (EMSA) external assessment baseline was accessed to identify high ability student participants is based on international standards of

assessment. This is the major academic assessment tool used for all students in the UAE. Students who performed a band of A or B in EMSA in this school were identified as above average and considered as possible high ability participants for this study. There were approximately 10,126 Grades 6, 7 and 8 students in Al Ain City at the time of this study. Students gaining A or B band represented the top 25% of these grades. By using EMSA as an international benchmarking tool I have can identify the high ability students with reasonable confidence that the small sample of participating students could represent the wider population gaining similar bands within Grades 6,7 and 8 in other Al Ain City and Abu Dhabi schools.

Another issue confronting the mixed method researcher is deciding the priority of weight given to quantitative and qualitative stages and when and how to integrate the results of both phases. Within this current study baseline quantitative data will be gathered from international benchmarking with the Torrance Test of Creative Thinking Figural Test A. Cohen et al. (2000) describe quantitative research as ‘a scientific approach to research, treating matter with hard, external and objective reality’ p7. Objective analysis of the TTCT data used the SPSS data programme. However a single data set is unlikely to be adequate to address the second research question relating creativity to classroom learning in general. Therefore more qualitative interpretations of data obtained from the Creative Traits and Characteristics of English Language Learners questionnaire (Appendix 6) will be included to examine the potential wider influences of FPS. In the post intervention data gathering stage, after twelve months, participants were re-tested using a second Torrance Test of Creative Thinking. This post test data gathering applied the Figural Test B, and a repeat of the Creative Traits and Characteristics of English Language Learners questionnaire was conducted with the same responding Arabic and English literacy teachers who worked daily with the 26 student participants over the period of the study.

### **3.6 Methodology for Analyzing the TTCT Figural Tests A and B**

Specific analysis of means using the SPSS programme focused on five creative thinking abilities in the TTCT figural test A as a baseline pre-test and Figural Test B as a post test. Reflection after quantitative data gathering and analysis will consider specific changes observed within and between groups that may offer answers to the research questions.

The following descriptions are of the tasks utilized within the tests. The first test is the Picture Construction Test in which participants are offered a jelly -bean or tear drop shape and asked to include this stimulus in their own original picture. The second test is the Picture Completion Test

in which participants are asked to structure and integrate ten sets of incomplete lines by adding to and building on their own ideas. The third and final test is the Line and Circles Test which offers three pages of parallel lines (Figural Test A) or circles (figural Test B), asking the participant to return to the same stimulus repeatedly perceiving it differently each time.

More explanation of analysis of student performance in these tests and how I will monitor and evaluate change in creative thinking abilities and possible impact of the Future Problem Solving intervention follows later in this methodology chapter in Step 3 within the practitioner action research design description.

### **3.7 Theory Linking Creative English Language Characteristics to Classroom Curriculum Learning**

The English Language Learners Questionnaire appears to link specific creative academic characteristics and skills to positive learning within classrooms in the Abu Dhabi learning environment. Quantitative data of means for literacy teacher observation responses within a questionnaire, report on students applying these academic performance skills. This Table of Data will report a comparison of teacher observations before and after the FPS intervention period. Comparing each group may determine if experiencing FPS is related to possible changes in students using these specific creative academic skills in their other classes.

### **3.8 English Language Learner (ELL) Creative Skills Questionnaire**

Content in the questionnaire was aimed at monitoring impact and change to answer the research question: Could Future Problem Solving creative problem solving skills offer opportunity for high ability students to access and engage more effectively in other curriculum content?

To gain measures of change in academic behaviours and skills I have applied three categories identified in the GOTCHA -Galaxies of thinking and Creative Heights of Achievement Project (1986-1987) to form the basis of an English Language Learners questionnaire (ELL). The following behaviours and skills were selected because they appear to be and were identified by the responding teachers as those most often put into use by successful learners.

Arabic and English literacy teachers were asked to record their observation of the participating students once at the start of the project and one year later. Specific creative characteristics and traits within three categories of cultural, school and language abilities form this second data gathering epistemological structure for knowing there has been observed change or not in creative tendencies by participating students. By applying the questionnaire to both groups I

am interested in seeing whether the FPS students show more development in these school, language and culture based creative characteristics than the non-Future Problem Solving participants.

The following descriptions of each category formed the basis for the ELL questionnaire. Appendix 6.

**School based creative characteristics**

- High ability in their native Arabic literacy compared to their peers
- Advanced in creative domains specifically fluency, flexibility, originality and elaboration.

**Language based creative characteristics**

- Willing and able to translate for their peers, within mixed ability classrooms.
- Literacy proficiency was well above other students who were also English Language Learners
- Ability to switch between languages
- Had superior knowledge of phrases and humor

**Culture based creative characteristics**

- Self-efficacy, pride and confidence in both the heritage Arabic and Western English culture
- Demonstrated a global sense of community and respect for cultural differences in multiple learning environments

**3.9 Teacher respondents for the ELL Questionnaire**

Questionnaires were used to collate data from a specific group of literacy teachers working in either English or Arabic, who all responded to the same questions in the same circumstances. The following table shows the distribution of teacher respondents for each of the two groups and the grade levels they were teaching.

	Grade 6	Grade 7	Grade 8	English Teacher Respondents	Arabic Teacher Respondents
FPS Students	6	9	1	3	3
Non-FPS Students	4	5	1	3	3

**Table 1** Teacher Grade Distribution

The table shows there were 6 responding teachers, 3 for each language. No teachers taught literacy in both languages. Teachers were responsible for a single grade level and responded for the FPS and Not FPS students. The Grade 6 English teacher for example responded for all 10 Grade 6 English students, both those in FPS and those who were not.

All respondents were experienced teachers and leaders in the curriculum development and delivery within this school where I was responsible for professional development content for all staff. To gain confidence the teachers' knowledge and ability to recognise the characteristics in the questionnaire was effective, discussion and examples of the characteristics and skills were explored at teacher professional development meetings before the FPS intervention. Interpreting and understanding the questionnaire for the responding teachers appeared to be secure.

Burton et al (2008) advise that questionnaires instructions are not ambiguous. It was important that respondents could manage and understand the information clearly in this Arabic language environment. The questionnaire and instruction were therefore presented as bi-lingual in both English and Arabic. Discussions were also held within a bi-lingual English Arabic professional development environment where an interpreter was used. A second issue identified by Burton et al. is a low response rate for respondents. As an experienced teacher I am aware of the pressure teachers experience that could place other paperwork ahead in priority over responding to the study questionnaire. To ensure this issue was acknowledged, I personally introduced and collected the questionnaire at negotiated times. This addressed the issue of no response through teachers disconnecting from the questionnaire.

### **3.10 Practitioner Action Research Design in this Study.**

The quantitative research design in this study follows five steps through a practitioner action research framework over one year of data gathering. Schmuck (1997) defines action research as an attempt to “ study a real school situation with a view to improve the quality of actions and results within it.” (P.28). The purpose of practitioner action research is also to improve ones own professional judgment and to give insight into better more effective means of achieving desirable educational outcomes.

#### **3.10.1 Step 1: Identifying the Problem Prior to Intervention.**

##### **Description of the difference in teaching methods offered in Future Problem Solving classes and non-Future Problem Solving classes.**

One task within my leadership role in the school involved gaining authentic reflection and feedback from teachers and students on the effectiveness of various learning programmes. Both students and teachers would respond to surveys, questionnaires and senior leadership team

meeting discussions. A common theme of disengagement for high ability students evolved within these reflections that has been described earlier in the Introduction.

#### **Non-Future Problem Solving Classroom Learning Environments.**

As an Academic Vice Principal I was tasked to make regular formal observations against set criteria in all classrooms in the school. Observation in non-Future Problem Solving classes showed the learning environment did not often permit creative thinking and in some cases actively discouraged creative thinking. Unique ideas expressed by high ability students were discouraged as the majority of high ability students naturally offered elaborated explanation. Teachers appeared to be unable and in some cases unwilling to allow the time needed for students to fully share these unique creative questions, problems and solutions to the curriculum content being offered in the lesson.

However, some classroom observations presented for staff appraisal lessons showed episodes with models of creative thinking processes presented by a few teachers in classes other than Future Problem Solving and these were popular with the students. These model lessons involved complex activities using mental skills of problem solving, fluency, flexibility, originality and elaboration of ideas. The high ability students demonstrated strong motivation to apply creative thinking processes in these activities. This student learning preference presented teachers with a problem as no programme had been sourced or researched for effective creativity development over time and not as a one off learning opportunity. At the time of this study there been no investigation into the possible positive impact of offering creative processes and skills may have in general learning over time in this learning environment of the UAE.

#### **3.10.2 Step 2: Planning and Implementing Action to Improve and Better Understand the Problem**

The observations of classrooms learning environments showed students' preferences in their learning were to apply creative skills such as being flexible and having choice, fluent and in-depth elaboration of their ideas and to be able to share unique original thinking. This preference was evident in high engagement, motivation and task completion to high standards. This led me to consider offering an internationally respected programme originally designed by E. Paul Torrance, Future Problem Solving Global Issues. Torrance shared the same focus I was experiencing; aiming to develop creativity for high ability students in the hope that these skills may link well to developing skills they could use in other curriculum content.

#### **General Student Participant Identification and Description**

All 26 participants were female, ranging in class level from Grade 6 - Grade 8, (age 10-13) and were described by their teachers to demonstrate above average ability in their EMSA

(Educational Students Measurement of Academics) exam results in Arabic and English literacy, achieving a band result of A or B. Students who had gained A or B passes in their EMSA assessments were invited to participate through a letter (appendix1) shared at a community consultation meeting. FPS is a programme that originally aimed to address creativity development for high ability learners. Therefore students who had not gained the higher scores in EMSA of A or B were not considered to be able to cope with the academic demands of the programme.

School administration leaders, Abu Dhabi Education Council (ADEC) parents and students were informed of the scope of the study. Twenty-six participants voluntarily participated in the study. Students in Future Problem Solving were learning in the programme as a withdrawal programme in addition to their usual ADEC non-Future Problem Solving classes. Two purposefully selected groups were monitored for changes in their creative thinking processes, over the course of one year. The purpose of the two groups was to allow for quantitative measurement comparisons to be made: those students learning in Future Problem Solving and those who were not.

The participating school's English and Arabic literacy teachers who were working daily with these students, were asked to complete the Creative Traits and Characteristics of English Language Learners questionnaire Appendix 6, prior to action intervention with student involvement in the Future Problem Solving Programme. A compilation of data from this initial questionnaire, student academic data EMSA and Renzulli's Three Ring Conception of Giftedness (1978), were analyzed to purposefully profile the composition of two groups. Within each group there were equal mixes of students described by their teachers as gifted and those described as not gifted learners. Description of each group follows in the next section. Comparison and analysis of data between the two groups is described in Chapter 4 results to identify impact of the intervention of FPS.

### Grade Level \* Learning Environment Cross-tabulation 1

			Learning Environment		Total
			1.0 FUTURE PROBLEM SOLVING	2.0 Non- FUTURE PROBLEM SOLVING	
Grade Level	6.0	Count	6	3	9
		% within Learning Environment	37.5%	30.0%	34.6%
	7.0	Count	9	6	15
		% within Learning Environment	56.3%	60.0%	57.7%
	8.0	Count	1	1	2
		% within Learning Environment	6.3%	10.0%	7.7%
Total		Count	16	10	26
		% within Learning Environment	100.0%	100.0%	100.0%

**Table 2** Grade Level Learning Environment Cross-tabulation 1

The Learning Environment Cross-Tabulation shows 34.6% of the total group of participants were in Grade 6, 57.7% representing the largest group were in Grade 7 and the smallest group were 7.7% were the Grade 8 participants. Although there were three grade levels represented in the two student participant groups there were no students who had previously experienced learning in Future Problem Solving.

The following group qualitative descriptions are based upon observation of learning behaviours in the identification of student participant stage prior to intervention action. They are intended to highlight the initial baseline similarities and differences between groups that support the purpose in identifying need for this study.

#### **Group 1.0: Students Participating in FPS.**

This group of participating 16 students were involved in FPS as a withdrawal programme. Their class levels ranged from Grade 6 to Grade 8, (10-14years). Their teachers were trained to identify the learning behaviours in Renzulli's Three Ring Conception of Giftedness (1978) and to apply these to describe the participants. Eight girls were identified by their teachers to be demonstrating strength in each segment of Renzulli's Three Rings in that they were high ability in academic attainment, creative and showed strong task commitment. My observations of all 8 students general learning abilities such as processing information, integrating experiences, abstract and original thinking, were that they attempted to independently and confidently apply

these in English, Arabic, Science and Math's classes.

The remaining 8 of the 16 group 1 girls were identified by their teachers and parents to be experiencing behaviour management issues in many of their classes. For these girls task commitment and motivation were identified to be lower than their peers within group 1. They demonstrated possible boredom with the usual classroom activities and anger was often expressed towards themselves, their peers and the teachers or parents. Inflexible teaching methods compared to classes where these students had more choice in both content and processes to learn was a challenge for these students. This is not an uncommon response in gifted learners and can exclude them from making progress academically.

#### **Group 2.0: Not participating in FPS**

The 10 girls in this group did not participate in FPS. They also ranged in class level from Grade 6 to Grade 8. Five girls in this group were reported by their teachers to be similar to Group 1 Gifted students in their positive demonstration of gifted characteristics in Renzulli's identification circles, above average ability, creative original thinking and task commitment.

The remaining five of these students were reported to be 'challenging' students in a number of classroom environments. These five high ability, non-FPS students were described by their teachers as 'having the ability but not the desire to complete classroom learning'.

#### **Step 3.10.3: Monitor and Evaluate Success of the Intervention**

##### **Data Collection Internal Credibility Validity Reliability**

Validity, reliability and internal credibility are all important inter-related considerations as I evaluated the impact of FPS specifically on creativity development in this study. Validity can be divided into external validity and internal validity. External validity refers to the degree in which the results can be applied to the wider population. By applying EMSA, an external assessment baseline that is based on international standards, to identify the A and B band students as participants for this study, the results could be generalised to students in the wider Abu Dhabi region who are achieving at this stage.

Renzulli's Three Ring Conception of Giftedness was a tool commonly used in the ADEC schools I was visiting in my role as Professional development presenter. The descriptions within this tool are described earlier and applied in this study to formulate the two participant groups as mixed A and B band students. I consider the participating school's literacy teachers' descriptions of the 26 participants' characteristics, traits and issues, are typical of the wider Abu Dhabi student population of high ability students.

Cohen et al. (2000) describe validity as an important key factor in research that is concerned with the question ‘Does the research measure what it is supposed to measure?’ Torrance applies the term ‘creative thinking abilities’ in the TTCT to a group of general mental abilities commonly brought into play in creative achievements: originality, elaboration, fluency, flexibility and resistance to premature closure. These specific abilities are measured and reported on to identify changes in creative thinking processes following experience of the Future Problem Solving programme. The positive feature of the TTCT compared to other tests of creativity such as Guilford’s creativity Tests for Children (Guilford (1970) Wallace and Kogan’s (1965) game like test, is that the TTCT offers activities deliberately developed to cue participants to explore different aspects of creative functioning that are clearly stated in the instructions and read aloud to the students. This deliberate prompting for specific creative output could increase the likelihood that the test taker will engage in creative processing. Furthermore, given that all participants were English second language learners, a measurement tool that did not rely upon English aptitude, such as in the TTCT would also be more likely to produce valid and reliable scores. To promote accessibility to the test instructions they were delivered orally in both Arabic and English.

#### **Internal Credibility**

Internal credibility considers trust and in this study grew in positive prolonged teaching and learning engagement with the participants over 12 months. The learning and testing environment in which both participant groups’ data was gathered was the also the familiar and natural classroom of the participants. Persistent development of this trustworthy environment and observation was aimed at strengthening internal credibility of the results. Internationally accepted guidelines for administering the international benchmarking TTCT test were strictly adhered to.

#### **Reliability**

In an attempt to secure reliability and objectivity in this study I have used Ashton Scholastic Inc. to score all participants’ TTCT, pre-test and post test responses. The tool applied for scoring is the streamlined scoring guide (Torrance, 1990). This test has undergone 9 years of developmental work to secure scoring reliability. Ashton Scholastic scorers are highly trained in the skill of scoring and providing detailed analysis of student creative responses. Training of scorers involves moderation between scorers to check for reliability.

Reliability of a measure refers to consistency in scores particularly over time, whether the research can be replicated and whether the data is representative of the population being studied

(Cohen et al. 2000). Torrance reports in his research review of the TTCT (2000) that several reliability studies of the TTCT indicate it is possible to maintain scoring reliability to be above .90 level. Such studies as Torrance (1972) Wallach (1968) support Torrance's view of scoring reliability.

#### **Torrance Tests of Creative Thinking Data Gathering Analysis Methodology**

In my attempt to interpret change in creative skills over the testing period of twelve months I have applied the TTCT as a quantitative international benchmarking measurement tool twice in the data gathering process, identified as Pre-Test and Post-test. The TTCT tool has been used by over 2000 research projects since its inception more than 40 years ago. The creative skills I have identified worthy of monitoring in Future Problem Solving are fluency, originality, elaboration and flexibility as shown in abstract titles and resistance for premature closing of ideas. As an experienced classroom practitioner I acknowledge value in these particular creative skills is in their general connection to other curriculum content and types of creative thinking that may lead to success both in a Future Problem Solving learning environment and other learning in a general classroom.

#### **Identifying Creativity in the TTCT**

The following descriptions create a lens for the specific creative skills being measured and where they are identified in the assessment TTCT tool. Scorers I employed from Ashton Scholastic are trained in identifying the various ways a student will respond creatively to show these skills.

- Fluency is the number of ideas the student expresses using the stimulus in a meaningful way in activity 1; Picture Construction and activity 2; Picture Completion.
- Originality is measured by the statistical infrequency and unusualness of the response.
- The sum of elaboration is calculated from all three activities: activity 1; picture construction, activity 2, picture completion and activity 3 the lines or circles activity. Two assumptions underlie the scoring for elaboration; the basic response must be meaningful and elaboration of detail is a creative function of the imagination.
- Abstractness of Titles that a student may assign to a figure drawn is scored in activity 1; Picture Construction and activity 2; Picture Completion. The Titles are evaluated on a scale ranging 0-3. 0 = an obvious generic answer, 1= simple descriptive title, 2= imaginative, descriptive title that goes beyond the concrete physical description, 3= abstract but appropriate title that goes beyond what is seen and tells a story.
- Resistance to Premature Closure scores is measured in activity 2; Picture Completion only and uses a scale of 0-2. Less creativity is evident in a response in which the incomplete figure is closed immediately with a single line or curve shutting down the

opportunity for more powerful original images. 0 = figure is closed with a direct route, 1= details are added outside the closed figure and 2= irregular and not necessarily straight lines form part of a picture. Monitoring Resistance to Premature Closure is an important measure for creative ability as it respects the mental leap for a student to consider a variety of options and delay recording their first response. This delay may allow original ideas to surface.

Resistance to premature closing measures and abstractness of titles measures are used to identify flexibility in this study.

#### **TTCT Figural Scoring, Checklist of Creative Strengths Leading to the Creativity Index**

In the TTCT figural scoring first provides scores for fluency, originality, elaboration, abstractness of titles, and resistance to premature closing. The Creative Strengths checklist further reports on criterion referenced measures of 13 indicators of evidenced creative strengths (Appendix 8) that could be used by a student in response to any of the three activities offered in the test. A rating of (+) counting as 1, is given for some evidence of one of the 13 strengths whereas (++) counting as 2 is given for repeated evidence of one of the 13 creative strengths. The Creativity Index is calculated from the average standard score for the five abilities of fluency, flexibility, originality, elaboration, abstractness of titles and resistance to premature closing. These are added to the number of points in the creative strengths ratings from the 13 creative indicators. Therefore the creativity index is reported on in this study as it is valued to be an overall indicator of creative potential with this chosen measurement tool. However the individual five creative skills are worthy to be report on separately as they are more easily applied to future classroom learning programme planning ad development.

#### **Creativity Identification Measures within the Torrance Test of Creative Thinking Activities**

The Torrance Test of Creative Thinking (TTCT) Figural tests A and B was one data gathering tool chosen that provides non-verbal figural activities measuring different aspects of creative functioning. The following brief descriptions of the specific activities students work through in the TTCT offer specific insight into how this measurement tool identifies changes in creative output in the student responses. Further explanation is offered showing how the TTCT arrives at the creativity index and identifies the creative strengths later in this chapter in Section 4; Reporting on Findings.

#### **Test Section 1 in the TTCT; The Picture Construction Activity**

In the first test activity *The Picture Construction Activity*, the participants are offered a picture or shape which they are asked to ‘*Think of a picture or an object which you can draw with this shape as a part. Try to think of a picture that no one else will think of. Keep adding new ideas to*

*your first idea to make it tell as interesting and as exciting story as you can.*

*When you have completed your picture, think up a name or a title for it and write it at the bottom of the page in the space provided. Make your title as clever and unusual as possible. Use it to help tell your story.*

A teardrop or jellybean image is used as the stimulus. Finding a purpose for something that has no purpose and to elaborate it to develop a purpose asks the participant to call on the creative skills being measured in this study of flexibility and originality. The following example from a Participant in Group 1 FPS shows her visual storytelling using the tear drop shape as the bottom of a boat and the scene below shows an owl falling into the ocean to an awaiting hungry fish.



*Activity 1 Sample Response after one year in Future Problem Solving*

This FPS participant was given a picture in the Torrance Figural Test B picture construction activity where she sees the dark shape as part of a whole imaginary scene. Her score of 98% for creative thinking is arrived at by combining specific creative skills for this activity; internal visualization, story -telling, articulation in context, presence of movement and action and environment, colourfulness of the imagery, fantasy and extending boundaries. These are all reported on as strengths in her overall creative thinking score.

### **Test Section 2 in the TTCT; The Picture Completion Activity**

The second test section The Picture Construction Activity participants are instructed to ‘*add lines to the incomplete figures on this and the opposite page, you can sketch some interesting object or pictures. Again try to think of some picture or object that no one else will think of. Try to make it tell as complete and as interesting a story as you can adding to and building up your first idea. Make up an interesting title in Arabic or English or both for each of your drawings.*’

This test gives the opportunity for in-depth presentation of a single object, scene or situation.

Avoiding an obvious or typical response creates tension and is described as resistance to premature closure in thinking. This contributes to measuring flexibility within this study. The invitation to tell a story is aimed at motivating the creative skill of elaboration also being measured in this study.

### **Test Section 3 in the TTCT. The Lines (Figural A pre-test) and Circles (Figural B Post-test) Activity**

The third and final test question in the TTCT offers the participant lines and circles asking them to return to the same object again and again and see it in different ways, disrupting prior thinking in order to do so. This activity specifically focuses upon the creative skill of flexible thinking. Fluency of ideas is also a focus in this test question. Originality and elaboration are also being measured in this question as students are instructed to ‘ *Try to think of things no one else will think of. Make as many different pictures as you can and put as many ideas as you can in each one. Make them tell as interesting a story as you can.* ’

## **3.12 Step 4: Report the Findings**

### **3.12.1 Torrance Test for Creative Thinking (TTCT) Analysis Methodology**

I have used the SPSS programme to report on changes in means within the TTCT. These are reported in both Tables and graphs. I will report on basic features and simple summaries with descriptive analysis on the characteristics of the numerical data. These will be further presented as profile plots displaying pre and post test responses on all four creative skills and the overall creativity index for both participating groups; those learning in FPS and those not. I have applied a specific, systematic and detailed approach to coding the origin of the data from the two specific groups, which respects anonymity for individuals and the school.

### **3.12.2 English Language Learner Characteristics Questionnaire Analysis Methodology**

I perceive the 8 statements in the ELL questionnaire I have made as indicators of creativity within English second language development for the participants in this study. I do not propose that they are the only indicators of creativity in English language learners but evidence of the chosen indicators could relate well as predictors of success in the classroom with curriculum learning. I have offered responding literacy teacher 8 specific qualitative statements that could potentially relate the Future Problem Solving creative learning to success in classroom learning.

Raw data was collated from English and Arabic literacy teachers working daily with the student participants in the form of agreement and disagreement to the statements. The teachers’ responses to the questionnaire’s statements about Creative English Language Learner characteristics were collated and analyzed. Findings and interpretation of results of changes in students using Creative English Language Characteristics are reported twice in one year for the

two purposefully composed groups in Tables 10 Chapter 4 Results. This data represents reality prior to intervention of the FPS programme participation and after one year of intervention. Data is qualitatively reported on with descriptions gathered from responding literacy teachers through the questionnaire. Arabic and English Literacy teacher responses will be reported as means and the difference between pre and post testing periods for both participating groups.

### **3.13 Step 5 Recommendations**

As the purpose of the study is to improve the learning environment by developing creativity opportunity for the participants, this will be the focus for recommendations. The indicators used to calculate the creativity index in the TTCT could be used to develop future appropriate curricula content and instructional methods possibly involving Future Problem Solving. Further recommendations in response to the results will be offered in the Discussion chapter 5.

### **Methodology Chapter Summary**

In this study I am concerned with understanding how high ability learners develop creativity through a specific programme, Future Problem Solving and how this may impact upon their general learning. Data gathering targets creativity of students involved in socially collaborative groups within the Future Problem Solving programme compared to students of similar ability not involved in Future Problem Solving.

Data analysis explores the theory that creativity development may impact on positive changes in learning for high ability students demonstrating their reaction specifically to Future Problem Solving skills and content. By following practitioner action research methodology this single school classroom-based study could be considered to be transformative as it might increase participants' knowledge, practice and opportunity to develop creative abilities for learners.

Knowledge is acquired and reflected upon in this study through measureable data and analyzed to make generalizations through my positivist lens. External validity could be verified as the participant groups are recognized to be typical of the wider Abu Dhabi student population of high ability students. Internal credibility was established through positive prolonged teaching and learning engagement with the participants over 12 months.

Two purposefully selected groups were assembled: students learning in Future Problem Solving (1) and those who were not (2). The purpose of the two groups was to allow for measurement comparisons to be made through the lens of two tools in the Primary data source the Torrance Test of Creativity Test (TTCT) and a secondary data source in the English Language Learners (ELL) questionnaire.

Practitioner Action Research follows five steps in this current research that has both professional

and personal orientation. The problem was identified; action was planned and implemented with intervention of the Future Problem Solving programme; The intervention was monitored and evaluated for impact on creativity development; Findings were analyzed and reported on to the school and Abu Dhabi Education community, the participating school teachers and leaders, Abu Dhabi Education Council and Canterbury University, Christchurch, New Zealand. Recommendations were made to the participating school, ADEC and cluster schools and to myself, the practicing action researcher, as to how this research could be improved and could possibly offer positive transformation in learning in the local schools.

The streamlined version of the Torrance Test of Creative Thinking figural forms A and B and Creative Characteristics and Traits of English Language Learners Questionnaire, provided the objective quantitative data to analyze change in creative thinking processes, learning skills and abilities that may be used by these high ability Arabic students: fluency, flexibility, originality and elaboration of ideas as well as school, language and culture based creative English language learning characteristics. These data was analysed and reported on using the SPSS programme. Qualitative interpretation is offered on the quantitative data.

Specific creative English Language Learner characteristics and traits described by the responding literacy teachers form the epistemological structure to provide a lens for identifying change in creative abilities that are common with successful learners within the common curriculum. Statistical analysis will examine patterns that may emerge which give meaning in answering the research questions. Attempts to identify possible changes in creative skills and potentially in academic performance will be reported on in the data.

## **Chapter 4**

### **Reporting Results**

#### **Chapter Introduction**

This chapter will present results, describe, analyze and summarize quantitative data from one primary data source in the Torrance Test of Creative Thinking (Figural Tests A for baseline and Figural Tests B as post test). Identifying change in creative abilities will address research question 1; *Can we improve the creative potential of high ability girls by offering the creative skills in Future Problem Solving?*

The second data source I will report on is; the English Language Learner's Creative Characteristics questionnaire is aimed at addressing the second research question;

*Could Future Problem Solving skills offer opportunity for students to access and engage more effectively in other curriculum areas?*

Analysis of data for the ELL questionnaire will support qualitative observations from literacy teachers on the 8 specific creative characteristics that could lead to success in classroom attainment.

#### **4.1 Presentation and Analysis of Torrance Test for Creative Thinking (TTCT)**

##### **Figural Pre and Post Test Results.**

To show a general understanding and identification of change in creativity skills within and between the 2 groups of participating students, measured indicators of creativity as part of the Torrance Test of Creative Thinking design will be reported on in four specific creative skills content: fluency, originality, elaboration, and flexibility through resistance to premature closure and abstractness of titles. Each quantitative data table will present Future Problem Solvers identified as 1 and Non Future Problem Solvers responses identified as 2. In addition all four creative abilities and 13 creative strengths in the test design are identified as the final creativity index. The TTCT Figural Form A was applied to all participants prior to the intervention of Future Solving programme commencing and is identified as 'Pre test'. TTCT Figural Form B was applied 12 months later and is identified as 'Post test'.

I will report on basic features and simple summaries will be offered in a descriptive statistics analysis of characteristics and patterns offered in the numerical data. Measures of central tendency are described through identification of the mean (average) so that individual and group creative responses and characteristics can be compared.

The following analysis investigated evidence for greater improvements in five measures of creativity over one year of learning for students experiencing the Future Problem Solving Programme compared with those students who were learning in a typical ADEC classroom and not learning in Future Problem Solving. A series of analyses within SPSS were used on the TTCT to assess evidence for an interaction effect indicative of changes between pre and post measures being greater for one group compared to the other. Tables display numerical representations of the mean and standard deviations for both groups for each of the five measures of creativity. Graphical representations were then used to further interpret this interaction effect.

The following profile plots display the Future Problem Solving learning Environment as 1.0 and the ADEC Non- Future Problem Solving learning environment as 2.0. The times for data gathering are indicated as 1 for pre- and 2 for post after one year.

## 4.2 Reporting on Torrance Test for Creative Thinking

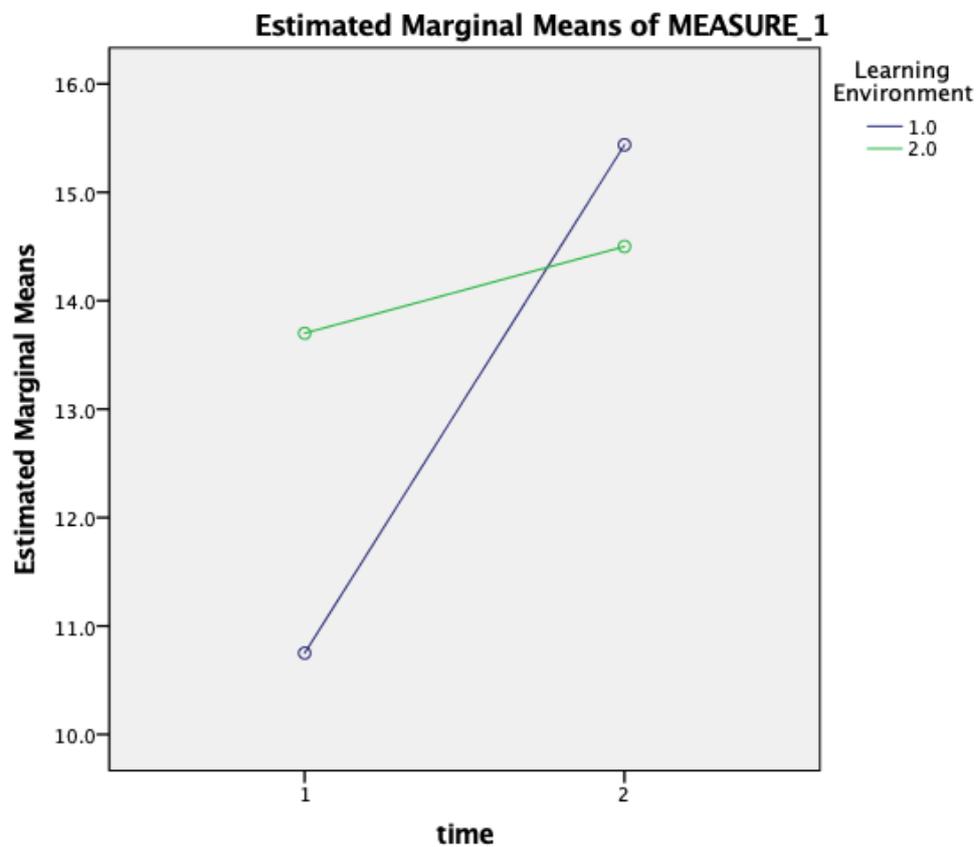
### 4.2.1 Torrance Test for Creative Thinking Fluency Future Problem Solvers and Not Future Problem Solvers

#### Fluency Descriptive Statistics

	Learning Environment	Mean	Std. Deviation	N
Fluency Pre-Test	1.0 (FPS)	10.750	3.5870	16
	2.0 (Non-FPS)	13.700	4.7621	10
	Total	11.885	4.2457	26
Fluency Post-Test	1.0 (FPS)	15.437	5.5853	16
	2.0 (Non-FPS)	14.500	3.9229	10
	Total	15.077	4.9471	26

Table 3 Fluency Descriptive Statistics

#### Fluency Profile Plot Pre and Post Test



The creativity skill of fluency showed a significant improvement for students learning in the Future Problem Solving environment moving from 10.750 to 15.437. Although students not learning in the Future Problem Solving environment started with a higher score they only improved slightly 13.700 to 14.500.

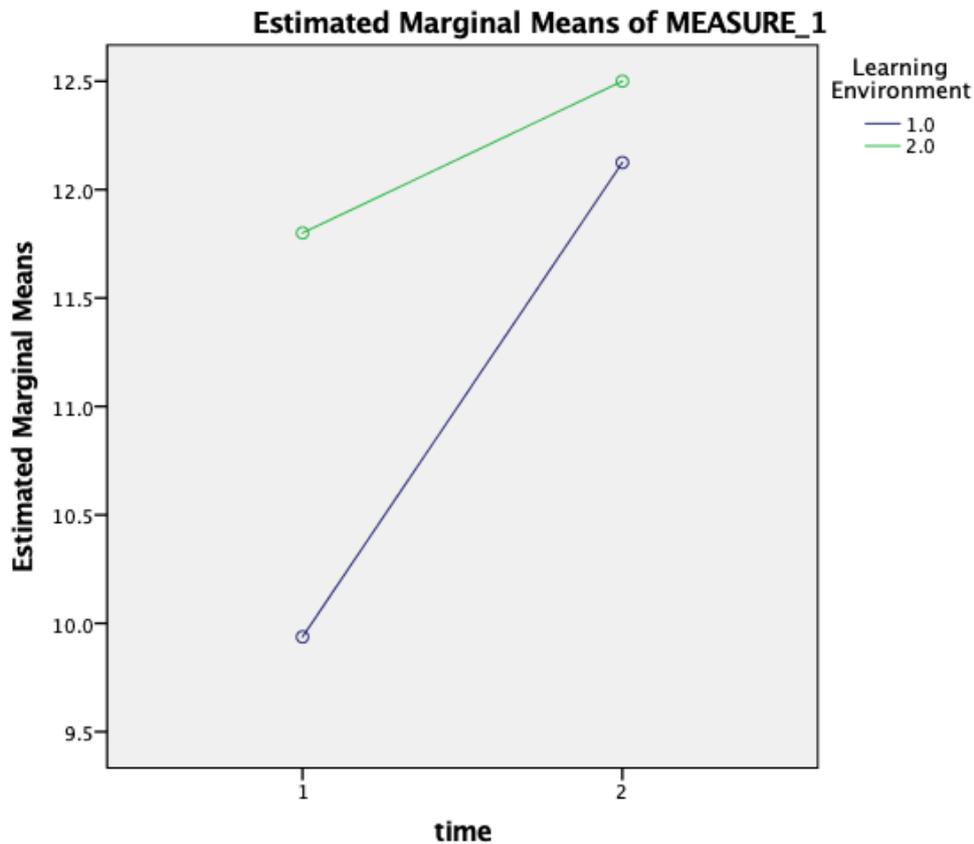
**4.2.2 Torrance Test for Creative Thinking Flexibility (Resistance to Closure) Future Problem Solvers and Not Future Problem Solvers**

**Flexibility Descriptive Statistics**

	Learning Environment	Mean	Std. Deviation	N
Flexibility Pre-Test	1.0 (FPS)	9.938	3.3160	16
	2.0 (Non-FPS)	11.800	3.0840	10
	Total	10.654	3.2978	26
Flexibility Post Test	1.0 (FPS)	12.125	2.8723	16
	2.0 (Non-FPS)	12.500	3.8658	10
	Total	12.269	3.2194	26

**Table 4** Flexibility Descriptive Statistics

**Flexibility Profile Plot Pre and Post Test**



In the creative skill of flexible thinking students learning in the Future Problem Solving environment again improved at a greater scale than Non FPS students moving from 9.938 to 12.125. Non-FPS students started with a higher score than FPS students in this creative skill of flexible thinking also and again only moved slightly from 11.800 to 12.500.

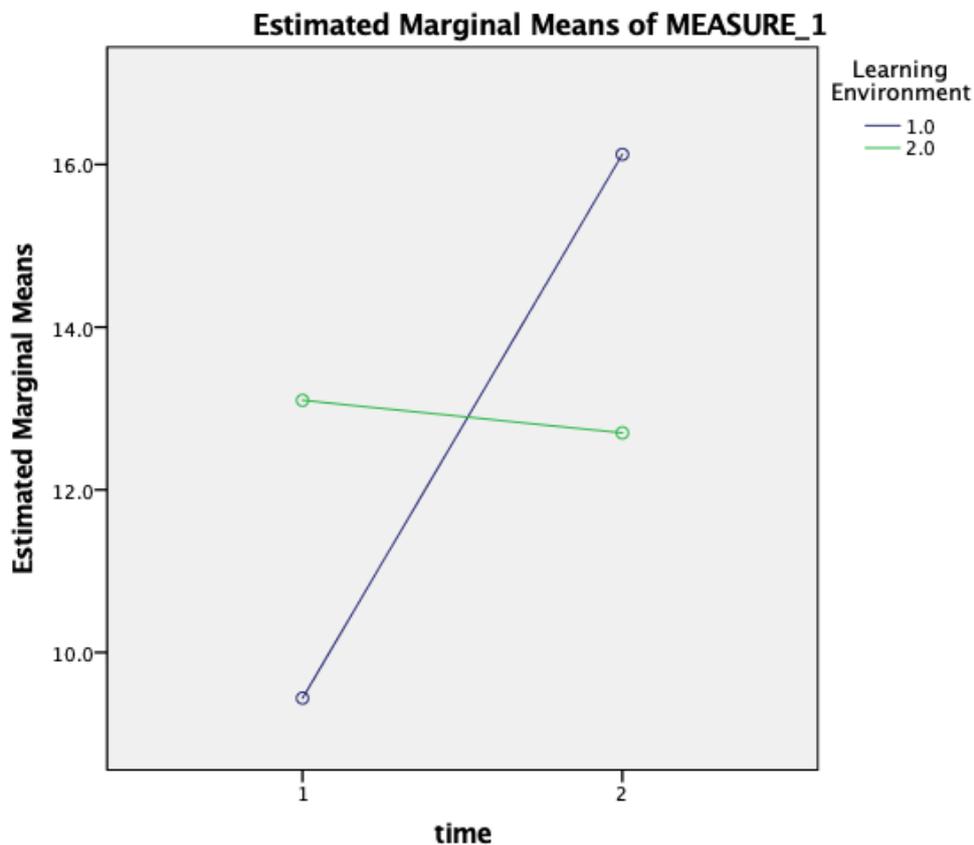
#### 4.2.3 Torrance Test for Creative Thinking Originality Future Problem Solvers and Not Future Problem Solvers

##### Originality Descriptive Statistics

	Learning Environment	Mean	Std. Deviation	N
Originality Pre-Test	1.0 (FPS)	9.437	2.9882	16
	2.0 (Non-FPS)	13.100	4.7246	10
	Total	10.846	4.0860	26
Originality Post Test	1.0 (FPS)	16.125	5.8066	16
	2.0 (Non-FPS)	12.700	6.5158	10
	Total	14.808	6.1969	26

Table 5 Originality Descriptive Statistics

##### Originality Profile Plot Pre and Post Test



The creative skill of originality shows the greatest improvement out of the four focus skills being measured for students learning in the Future Problem Solving environment moving from 9.437 to 16.125. However it is significant to note that the non-FPS students started higher than the FPS students and after one year showed a decline in their demonstration of originality moving from 13.100 to 12.700.

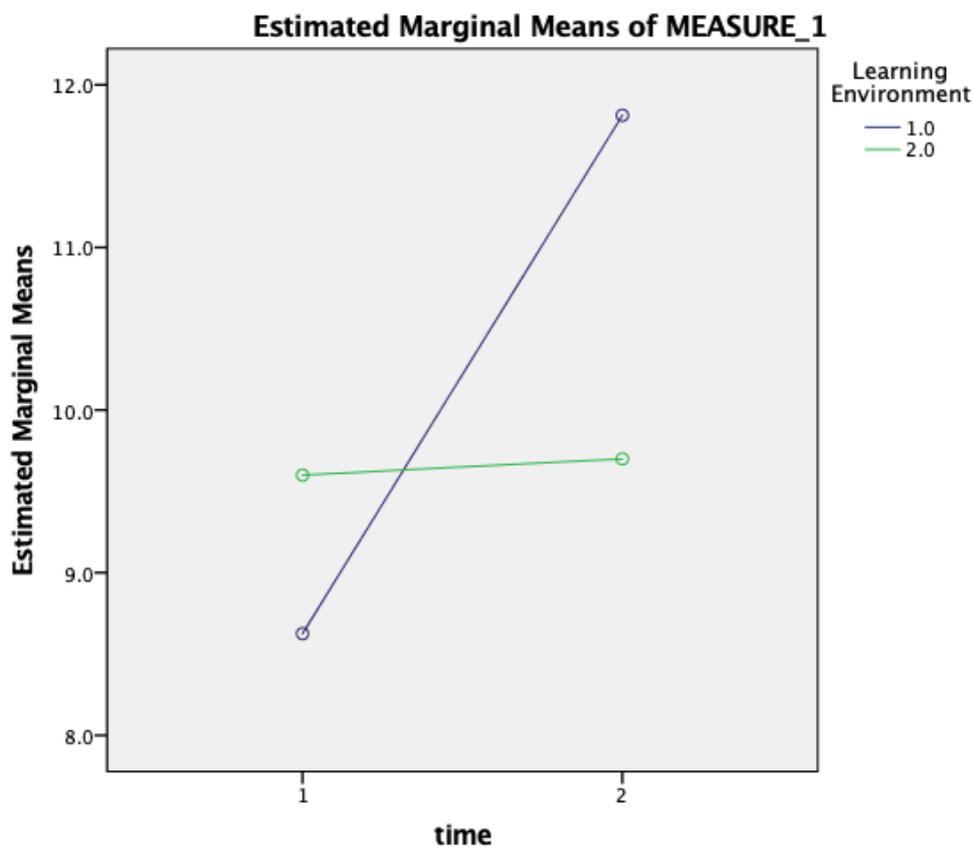
**4.2.4 Torrance Test for Creative Thinking Elaboration Future Problem Solvers and Not Future Problem Solvers**

**Elaboration Descriptive Statistics**

Learning Environment	Mean	Std. Deviation	N
Elaboration Pre-Test	1.0 (FPS)	8.625	2.7049
	2.0 (Non-FPS)	9.600	2.1705
	Total	9.000	2.5140
Elaboration Post-Test	1.0 (FPS)	11.813	2.4824
	2.0 (Non-FPS)	9.700	2.5408
	Total	11.000	2.6683

**Table 6** Elaboration Descriptive Statistics

**Elaboration Profile Plot Pre and Post Test**



In the creative skill of elaboration students learning in Future Problem Solving environment showed a significant improvement moving from 8.625 to 11.813 compared to Non Future Problem Solving students who barely improved from 9.600 to 9.700.

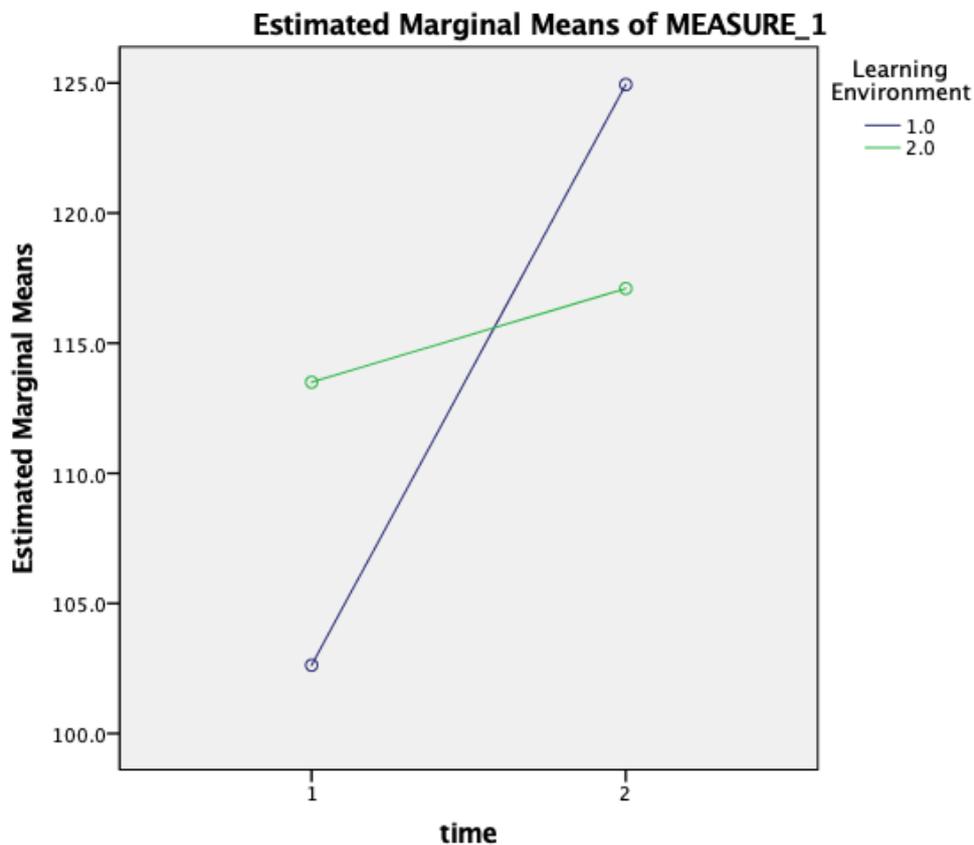
#### 4.2.5 Torrance Test for Creative Thinking Creativity Index Future Problem Solvers and Not Future Problem Solvers

##### Creativity Index Descriptive Statistics

	Learning Environment	Mean	Std. Deviation	N
Creativity Index Pre-Test	1.0 (FPS)	102.625	14.8003	16
	2.0 (Non-FPS)	113.500	13.3770	10
	Total	106.808	14.9987	26
Creativity Index Post-Test	1.0 (FPS)	124.937	13.6356	16
	2.0 (Non-FPS)	117.100	17.2205	10
	Total	121.923	15.2785	26

Table 7 Creativity Index Descriptive Statistics

##### Creativity Index Pre and Post Test Profile Plot



The Creativity Index is calculated from the average standard score for the four abilities added to the number of points in the creative strengths ratings from the 13 creative indicators. Students learning in Future Problem Solving gained strong improvement despite starting well below the Non Future Problem Solving students as they moved from 102.625 to 124.937 in their mean score. Non- Future Problem Solving students moved slightly from 113.500 to 117.100.

TTCT Creativity Pre and Post Test Averages in National Age Percentile Score										
FUTURE PROBLEM SOLVING and Non-FUTURE PROBLEM SOLVING										
	Fluency		Flexibility		Originality		Elaboration		Creativity Index	
	FPS	Non FPS	FPS	Non FPS	FPS	Non FPS	FPS	Non FPS	FPS	Non FPS
<b>Pre</b>	18.875	30.1	36.125	49.9	27	37.3	55.4375	67.1	35.75	52
<b>Post</b>	45.4375	42.5	57.25	57.1	63.625	46.3	83.3125	71.6	73.9375	57.5
<b>Change</b>	<b>+26.5625</b>	<b>+6.3</b>	<b>+21.25</b>	<b>+7.2</b>	<b>+36.5625</b>	<b>+9.7</b>	<b>+27.875</b>	<b>+4.5</b>	<b>+38.1875</b>	<b>+5.5</b>

**Table 8** TTCT Creativity Pre and Post Test Averages in National Age Percentile

Learning Environment	Fluency Pre-Test	Fluency Post-Test	Flexibility Pre-Test	Flexibility Post-Test	Originality Pre-Test	Originality Post-Test	Elaboration Pre-Test	Elaboration Post-Test	Creativity Index Pre-Test	Creativity Index Post-Test
<b>FPS</b>										
Mean	10.750	15.437	9.938	12.125	9.437	16.125	8.625	11.813	102.625	124.937
N	16	16	16	16	16	16	16	16	16	16
Std. Deviation	3.5870	5.5853	3.3160	2.8723	2.9882	5.8066	2.7049	2.4824	14.8003	13.6356
Minimum	8.0	8.0	2.0	8.0	4.0	8.0	4.0	8.0	64.0	107.0
Maximum	16.0	28.0	15.0	17.0	14.0	26.0	13.0	18.0	123.0	144.0
<b>NotFPS</b>										
Mean	13.700	14.500	11.800	12.500	13.100	12.700	9.600	9.700	113.500	117.100
N	10	10	10	10	10	10	10	10	10	10
Std. Deviation	4.7621	3.9229	3.0840	3.8658	4.7246	6.5158	2.1705	2.5408	13.3770	17.2205
Minimum	8.0	9.0	8.0	6.0	8.0	5.0	6.0	7.0	100.0	100.0
Maximum	21.0	19.0	18.0	18.0	21.0	25.0	13.0	13.0	141.0	145.0
<b>Total</b>										
Mean	11.885	15.077	10.654	12.269	10.846	14.808	9.000	11.000	106.808	121.923
N	26	26	26	26	26	26	26	26	26	26
Std. Deviation	4.2457	4.9471	3.2978	3.2194	4.0860	6.1969	2.5140	2.6683	14.9987	15.2785
Minimum	3.0	8.0	2.0	6.0	4.0	5.0	4.0	7.0	64.0	100.0
Maximum	21.0	28.0	18.0	18.0	21.0	26.0	13.0	18.0	141.0	145.0

**Table 9** Analysis of Torrance Means

#### 4.2.6 Summary of Torrance Test of Creativity Analysis

The above analysis of Torrance means shows that there is a clear repeated pattern in the groups' creative skill responses in the TTCT results. All four creative skills were significantly stronger for Future Problem Solving group 1 after one year in Future Problem Solving compared to the Group 2 students who were not involved in Future Problem Solving. There was slight improvement in all four elements of creativity being measured for Non-Future Problem Solvers: fluency, flexibility, elaboration and the final creativity index. However, significant positive development in all four elements of creativity being measured and the creativity index is observed for students who were learning in Future Problem Solving environment.

In all four creativity areas and the creativity index Non-Future Problem Solving learners were higher in their baseline scores to start with. However students who were not learning in the Future Problem Solving programme in this study did not develop creative skills at the same level as identified in the TTCT and in fact went backwards in their ability to apply the critical creative skill of originality. The development of the TTCT creative skills being measured in this study show students learning in FPS developed these skills at a greater level and rate over the year of data gathering.

#### 4.3 Reporting on the English Language Learner's Creative Characteristics Questionnaire

The following section will focus on answering the second research question.

While the previous TTCT data explores evidence of change in creative learning skills the ELL data will be reported on to support the connection of creativity development potential for improved classroom learning. To answer this question I designed an analytical questionnaire aimed at exploring associations and relationships between creative English Language Learner traits and characteristics and creative skill development. The relevance of this data is in the theory formed from by the responding teachers and myself as a participating research teacher observing a correlation between these 8 purposefully chosen creative language learner skills and positive access and engagement in the wider curriculum. The questionnaire aims to formalize teacher observations of creative learning behaviours. Specific data identifies creative behaviours as predictors of success in the classroom, for both Future Problem Solving participants and non Future Problem Solving participants. The ELL questionnaire data aims to view creative skill development that could possibly lead to improved outcome attainment within the curriculum and therefore the data can clearly relate to my second research question: *Could Future Problem Solving creative problem solving skills offer opportunity for high ability students to access and engage more effectively in other curriculum content?*

The type of data reported on from the questionnaire is continuous with responding teachers giving 5 levels of response of agreement or disagreement to 8 statements that are grouped into 3 categories; school, language and cultural based creative characteristics in English language learners. The design of the questionnaire asked the respondents to either agree or disagree with 5 levels of agreement or disagreement such as would be found in a Likert scale. To avoid inconsistency and to strengthen validity, I personally administered the questionnaire with an accompanying translator to each responding teacher, as a baseline at the beginning of the school year and later at the end of the academic year.

Observation of the 8 creative behaviours identified in the questionnaire for each of the 16 participating students, was conducted in English and Arabic language classes. The respondents were Arabic and English literacy teachers of the 26 participants. Baseline data collected as responses from these English and Arabic teachers before the intervention stage of offering creative opportunity within the Future Problem Solving Programme is identified as pre-test. After one year, the same questionnaire was repeated and reported as the post period.

#### 4.3.1 English Language Learner Literacy Teachers Questionnaire Group Response

	FUTURE PROBLEM SOLVING (1.00) Non FUTURE PROBLEM SOLVING (2.00)	Mean	Difference
Arabic literacy teachers	1.00	1.2500	
Lang1dif: Willingness and ability to translate for her peers	2.00	.5000	.75000
Arabic literacy teachers	1.00	1.3125	
Lang2dif: Uses literacy skills that may be well above other ELL	2.00	.1000	<b>1.21250</b>
Arabic literacy teachers	1.00	1.4375	
Lang3dif: Is able to switch between English and Arabic easily	2.00	.9000	.53750
Arabic literacy teachers	1.00	1.3125	

Lang4dif: Shows superior knowledge of phrases and humour	2.00	1.0000	.31250
English literacy teachers	1.00	1.4375	
Lang1dif: Willingness and ability to translate for her peers	2.00	-.2000	<b>1.63750</b>
English literacy teachers	1.00	1.2500	
Lang2difE: Uses literacy skills that may be well above other ELL	2.00	.1000	<b>1.15000</b>
English literacy teachers	1.00	1.5625	
Lang3difE: Is able to switch between English and Arabic easily	2.00	.3000	<b>1.26250</b>
English literacy teachers	1.00	1.3750	
Lang4difE: Shows superior knowledge of phrases and humour	2.00	-.2000	<b>1.57500</b>
Arabic literacy teachers	1.00	1.1250	<b>.72500</b>
Cult1dif: Shows strong self efficacy, pride and confidence in both Arabic and Western English Culture	2.00	.4000	
Arabic literacy teachers	1.00	1.1250	<b>1.22500</b>
Cult2dif: Demonstrates respect for cultural differences in multiple learning environments	2.00	-.1000	
Arabic literacy teachers	1.00	.8125	<b>.81250</b>
Scho1dif: Shows a high ability in Arabic literacy compared to her peers	2.00	.0000	
Arabic literacy teachers	1.00	1.8750	<b>1.07500</b>
Scho2dif: Is advanced in creative skills specifically 1 or more of: fluency, flexibility, originality and elaboration	2.00	.8000	
English literacy teachers	1.00	1.0000	<b>1.00000</b>

Cult1dif: Shows strong self efficacy, pride and confidence in both Arabic and Western English Culture	2.00	.0000	
English literacy teachers	1.00	1.1250	.79167
Cult2dif: Demonstrates respect for cultural differences in multiple learning environments	2.00	.3333	
English literacy teachers	1.00	1.3125	<b>.64583</b>
Scho1dif: Shows a high ability in Arabic literacy compared to her peers	2.00	.6667	
English literacy teachers	1.00	1.5000	<b>1.30000</b>
Scho2dif: Is advanced in creative skills specifically 1 or more of: fluency, flexibility, originality and elaboration	2.00	.2000	

**Table 10** English Language Learner Literacy Teachers Questionnaire Group Responses

Each of the 8 creative English Language learners' characteristics is recognised as a variable. The analysis indicates if there is evidence for group 1 (Future Problem Solving participants) to have demonstrated a difference from group 2 (Non Future Problem Solving participants) in terms of changes in scores from pre to post (the difference scores reported above). I have bolded those results to show evidence of significant difference between the two groups. These results suggest positive differences in all Culture and School items for students involved in the Future Problem Solving learning, but only English teachers see differences in the Language items – Arabic teachers do not for the Language items.

#### 4.3.2 Conclusions from the English Language Learners Creative Characteristics Questionnaire

Clearly students involved in Future Problem Solving were observed by their literacy teachers to show the greatest improvement compared to the group of students who were not involved in Future Problem Solving in creative learning characteristics in the questionnaire for these English language learners.

Arabic literacy teachers did not report a significant difference between students learning in Future Problem Solving and those who were not in both language components of the observation: their willingness to translate between Arabic and English and superior knowledge

of phrases and humour. However English literacy teachers reported more than double the difference between the two groups. English literacy teachers may have been more dependent on the skill of translation within a dominantly Arabic language environment and therefore more observant than Arabic literacy teacher respondents for this skill to translate. However, the same teachers reported on both Future Problem Solving and Non- Future Problem Solving students.

The results may imply the Future Problem Solving participants are better resourced to access positive learning in their other classes where learning content within the curriculum values and requires these 8 skills.

## **Chapter 5**

### **Discussion**

#### **Chapter Introduction**

The following chapter will discuss my interpretation of the data results and their possible transformative implications within the context of the participating school and other Abu Dhabi ADEC schools. This study's relevance to other research findings in the area of creativity and gifted education and those specifically involving Future Problem Solving will be explored. Implications that may offer insight into creativity development impacting on academic attainment opportunities will be addressed as they relate to the specific research questions. New questions surfacing from the results will be identified. Limitations of this study and other possible contributing factors will be identified.

The layer of change investigated for impact in this study was a specific programme; The International Future Problem Solving Programme. The learning opportunities offered within this programme were specifically designed by Torrance for developing creative behaviours and traits in gifted and talented learners. My initial observations showed such opportunities were not commonly apparent outside the Future Problem Solving learning environments. There was an absence of recognising creative thinking as an indicator of giftedness in the UAE classrooms I was working in. This current study sought to recognize the importance of creativity as a possible indicator of giftedness that may strengthen academic attainment within the curriculum. However in the following discussion I acknowledge the possibility of factors that may impact on developing student creative learning behaviours other than the intervention of Future Problem Solving

## **5.1 Other Environmental Factors that may have Influenced Creativity Development.**

### **5.1.1 Innovation Focus in the United Arab Emirates**

It was expected that this investigation might show developments in creativity skills for both the FPS and Not FPS participating groups within an environment of educational change where creativity and innovation was already a focus point. New teaching practices and curriculum content in the UAE had already begun through Discovery learning to introduce perceived creative skills. Although all participating students were offered this ADEC focus on Discovery learning it was surprising to reveal how significant the positive development in creative skills was for those students who were involved in Future Problem Solving compared to those who were not. It was a significant and unexpected concern to reveal students in this study who were not learning in Future Problem Solving showed less ability to apply the creative skill of originality after one year. The results seem to suggest that innovation focus in the ADEC classrooms did not have the positive impact on creativity development nor improve students ability to access creative characteristics and traits such as those investigated within the 8 English Language Learning skills for students not learning in Future Problem Solving.

### **5.1.2 Teacher Impact on Creativity Development Transformation**

Although this study does not specifically focus data on teacher impact it cannot be excluded in any learning environment. Hattie (2003, 2009) tells us passion is one of the defining traits of teachers who make a difference. Some teachers place more importance on a type of creative ability such as elaboration or fluency and this could impact on reliability as students were experiencing learning environments other than that of FPS. I was the only teacher delivering Future Problem Solving to Group 1. My enthusiasm and positive attitude toward the Future Problem Solving Programme and all of the four creative skills being taught and measured cannot be ruled out as a contributing factor to developing persistence and student engagement. My own teacher passion for FPS and the skills within the programme could have indirectly had a positive impact upon engagement in developing creative learning characteristics for students learning in FPS.

Renzulli (1986) identified three major interacting components that he considers constitute the ideal teacher of the gifted. Firstly, he said, there is the importance of teacher knowledge. Secondly, the teacher needs to have the personal qualities of flexibility, openness to experience and new ideas, a high energy level, optimism, commitment to excellence and enthusiasm for living (p.85). Thirdly teachers need to have passion for knowledge and learning of the material they are teaching. Many of these characteristics and qualities identified by Renzulli for teachers, echo the same characteristics I have investigated in development of

creativity through Future Problem Solving in gifted and talented learners. This would suggest an imperative that teachers show these creative characteristics in order to provide appropriate educational environments for developing creativity linking to positive academic attainment for high ability learners. As a coach/teacher of Future Problem Solving for 25 years I have observed these characteristics and qualities identified by Renzulli for teachers, are imperative in gaining success for students involved in the programme.

#### **5.1.3. Creative Characteristic and Traits in English Language Learners Impact on Creativity Development Transformation**

All students in this Arabic school are English second or third language learners. Many creative skills are required constantly to successfully transition between their Arabic home language and English. It could be assumed that this multi-language environment enhances creativity development. However, it is clear from this study Future Problem Solvers are identified by their literacy teachers to show the greatest improvement applying creative language characteristics in all three categories: school based, language based and cultural based compared to students not involved in Future Problem Solving. The assumptions expressed by teachers that the Arabic English second language students were limited to show development or strength in creativity skills appears to be disproven by the results. The results suggest that the complementary inter-play between innate biological factors of exploring problems creatively and environmental factors of this specific programme is positive in the development of creative skills with those participants learning in FPS.

#### **5.1.4 Transformative impact of Future Problem Solving**

Future Problem Solving appears to work in its own terms. Student engagement and motivation to learn appear to thrive within this programme. However I sought to question the impact and uptake the skills of FPS could have in other learning environments.

This current practitioner action research led to uptake in response to the positive changes in learning for Future Problem Solving students that could be considered to be transformative for this school, other schools in Al Ain City and Abu Dhabi ADEC schools, who committed to training in this programme. Change was affected primarily for those students involved in Future Problem Solving as they were more actively applying both the student creative English language learner skills and the specific creative skills in Future Problem Solving in their other classes. The participating school actively embraced Future Problem Solving by encouraging me to deliver teacher training in both content and teacher practice to the full staff. Beyond this school there were cluster schools in Al Ain City and Abu Dhabi ADEC schools who attended

training in Future problem Solving that I was asked to deliver by the Abu Dhabi Education Council. The next step in identifying transformation was being assigned the task of creating substantial resources that all teachers employed by ADEC in the Abu Dhabi region could access through their professional resources and teacher development digital portal. Learning outcomes within the English Grade 7 ADEC curriculum were identified as effectively being delivered through Future Problem Solving content.

In rapidly developing learning environments such as the United Arab Emirates, where creative learning programmes for high ability students are yet to be sourced, this strong uptake from schools other than the participating school suggest Future Problem Solving could be seen as a resource that matches well with the need to create a transparent link between innovative creative thinking and curriculum engagement.

## **5.2 Positioning Creativity Development in Future Problem Solving and Relevant Educational Theory.**

### **5.2.1 Renzulli**

Renzulli's (1978) states gifted behavior can be identified when there is an interaction between three clusters of human traits: above-average general and/or specific abilities, high levels of task commitment (motivation) and high levels of creativity. Motivation is also identified in the English language learners' creative learning data. Teachers reported specific indicators identified in the English Language Learners skills observations for Future Problem Solving participants and support Renzulli's interaction 3 ring clusters that were stronger are self-efficacy and application of fluency, flexibility, elaboration and original ideas. This data supports the interaction of Renzulli's three rings engagement in learning for Future Problem Solving students who appeared to develop these creative characteristics and traits well beyond those students not involved in the Future Problem Solving.

### **5.2.2 Gagné**

Gagné (1999) identifies the importance of environment for developing innate gifts into demonstrated talent. The creative skills in Future Problem Solving could be seen to offer an environment in which students were more willing to creatively demonstrate skills that led to task commitment both within and beyond the Future Problem Solving class as they transferred these creative skills into other learning environments as reported by the literacy teachers responding to the English Language learners questionnaire.

### **5.2.3 Scholastic Testing Service, Inc. and Future Problem Solving Programme International**

Scholastic Testing Service, Inc. and Future Problem Solving Programme International collaborative longitudinal study (2010) utilized the Torrance Tests of Creative Thinking (TTCT) to evaluate the impact of Future Problem Solving on learners. The findings in this current study support their findings that Future Problem Solving students gained higher increases in the skills identified in the creativity index. This preliminary investigation adds to the available research and suggests a need for further investigations in the area of creativity for high ability students and the possible role of Future Problem Solving.

Although it could be considered that single school based studies such as this one was transformative as there was an increase in participants' knowledge, sense of worth through the development of creative skills (Brennan & Noffke, 2009) I would recommend future study would be strengthened by a mixed methodology approach where student voice was involved as a data source.

### **5.2.4 The TTCT Figural Test tool as an Assessment for Creativity**

Because emotional, physical, and mental factors are reported by Torrance (2000) to affect motivation and creative functioning, the psychological climate of any testing environment may not be the most stimulating and comfortable for students to offer creative responses. Creating a problem-solving environment when introducing the TTCT test may counter the restriction on creativity output. The administrators manual advises teachers to 'Above all attempt to maintain a friendly, comfortable, warm relationship with the group.'p.4

Would using different measuring tools offer a different picture in the results? I believe future study into the impact of FPS on the development of creativity and positive engagement in learning in other classes, would be strengthened by exploring more diversity in measurement tools.

## **Discussion Chapter Summary**

The positive results for students learning within the Future Problem Solving environment led to uptake within the participating school and other Abu Dhabi education Council schools in the area and therefore could be considered transformative.

Other contributing factors that may have influenced the impact of Future Problem Solving on developing creativity such as ADEC's focus on discovery innovation learning that was being introduced in other classes and all students were English language learners, are identified as

having minimum impact compared to the positive environment experienced in Future Problem Solving where critical and creative thinking could flourish.

Although teacher impact cannot be excluded in the strong development of creativity for Future Problem Solving participants, the transition of the skills and creative thinking into other learning areas would support the consideration that the programme and not the teacher had the greatest influence in developing creativity.

## **Chapter 6 Conclusions**

### **Chapter Introduction**

This concluding chapter will summarize the significance of the study. It will highlight implications for teachers and their practice. Finally, recommendations for further research will be made in the area of creativity development for gifted learners and the potential positive impact on learning in other areas.

### **6.1 Significance of this Study**

The quantitative data analysis from the Torrance Test of Creative thinking and the English Language Learner questionnaire suggests participation in the Future Problem Solving learning environment offered a strong positive impact upon both creativity development and skills to potentially strengthen curriculum learning. In collecting data for both creativity development and skills for curriculum learning, I am suggesting a more transparent link could be identified for educators to view creativity as a possible pathway for academic growth within the curriculum.

Bloom (1994) stated “with the explosion of knowledge that has taken place during the past years, the ability to use higher mental processes has assumed prime importance”(P.10). With the demand to understand and cultivate creative thinkers in education becoming an intense focus in schools internationally and more recently in the United Arab Emirates, this study holds contemporary value. The higher functioning mental ability of creativity is a valuable resource recognized in the UAE and this study could create a transparent link between curriculum learning and creativity development. This pilot study could lead to further investigations into the possible role of Future Problem Solving to cultivate creative thinkers globally. Personal research on this topic in the future could be guided by this pilot study.

This study highlights the positive impact of creativity development within Future Problem Solving on learning in areas beyond the Future Problem Solving programme. An

examination of the literature identified the key role of modern definitions of gifted and talented students used for identification purposes that recognize existing and potential capabilities, characteristics and traits. Students with high potential or innate capability require special programmes and services to develop these qualities further. Students learning within the special programme of Future Problem Solving appear to demonstrate strong development in existing and potential capabilities in the focus of this study, creativity. The ADEC focus on innovation within teaching practices and learning strategies in classrooms for all participants did not appear to have the impact Future Problem Solving had in developing creative learning characteristics. This is apparent in the results showing non Future Problem Solving students not progressing in creativity and in some cases declining in their ability to apply creative thinking strategies that could possibly support them in learning both within and beyond Future Problem Solving.

Although the study was limited to only one school, it contributes towards an understanding of the strengths of this international programme to develop creativity for Gifted and Talented Grades 6-9 learners and offers a resource to strengthen their ability to access and engage in other curriculum content with increasing ability to modify and transform their thinking through the skills of flexibility, fluency, elaboration and elaboration.

## **6.2 Implications and Recommendations for Future Practice**

### **6.2.1 Stepping up into Deliberate Education Focus for Creativity Development**

With an increasing need for modifications and transformations in this evolving education environment, this study has highlighted there is a strong relationship between skills for student attainment and creativity development. Implications for teachers working with high ability students who are also learning in an English medium environment as English language learners, support Guilford's inclusive theory which states creativity is present in all people and can be nurtured or enhanced through deliberate educational efforts. A deliberate and explicit approach involving creativity development and possibly FPS in pre-service and in-service teacher training could benefit student engaging and accessing skills for positive learning in the curriculum.

The results in this study appear to suggest that positive creativity development aligns well with positive curriculum learning. Could this be due to improved engagement as a result of the FPS topic content, skills and possible teacher enthusiasm? How students feel towards their learning in FPS and how they apply their FPS learning to advance their learning in other classes would be worthy of future investigation. The results in this study do suggest that students in FPS were more engaged in other classes and more confident to apply the 8 creative skills the participating

school teachers identified to lead to success in their other classes.

#### **6.2.2 Identifying Links Between Curriculum Content and Future Problem Solving**

As the purpose of the study was to improve the learning environment by developing creativity opportunity for the participants, the specific indicators used to calculate the creativity index in the TTCT could be used to develop future appropriate curricula content and instructional methods possibly involving Future Problem Solving. The results of this study could motivate educators to identify links between curriculum content and Future Problem Solving. Future study could possibly propose transparent pathways for curriculum learning outcomes in English and Arabic to be delivered through Future Problem Solving content and skills.

#### **6.2.3 Creativity as a Channel for Academic Development**

It would seem that creativity delivered through the Future Problem Solving programme could be given the respect it deserves to be a channel for academic development and possibly as a learning area in its own right. Torrance described the creativity assessment tool chosen in this study offered and measured models and analogies of creative thinking processes required by daily life. Findings of this study may be relevant in transforming the wider education field of schools in the United Arab Emirates and beyond who have identified similar teaching and learning needs for developing creativity and a lack of effective resources for engaging high ability students.

#### **6.2.4 Building Teacher Aptitude in Developing Diverse Creative Learning Environments**

High quality teaching and learning for gifted students should be based on the needs of the students. Teachers need to be knowledgeable in terms of practice and theory of the Future Problem Solving Programme. They need to be experienced, supportive and able to facilitate the flexibility, fluency, elaboration and original thinking that indicate creative output in students in this study. Not only the content of the programme should be addressed but cognition of the particular traits and characteristics related to creativity in high ability students that demand teachers to develop diverse and creative experiences such as those offered in Future Problem Solving.

#### **6.2.5 Channels of Communication for Decision Makers in lead roles of Teacher Professional Development to Improve Creative Learning Opportunities for High Ability Students**

The success of identifying and meeting the specific learning needs for creative development of high ability English Language Learners requires establishing channels of communication among the administration leaders, teachers of Gifted and Talented Education and teachers of English Language Learners programming. Topics of Professional Development and various

workshops to eliminate barriers could include:

1. A definition for Gifted and Talented which could include creativity as an identifying characteristic or trait
2. English Language Learning strategies for the classroom that specifically align with creative behaviour and traits
3. Strategies that maximize an English Language Learners ability to express knowledge, inquiry or show visual evidence of learning to express themselves creatively while developing English
4. Understanding the ELL cultural contexts that highly value collaboration between curriculum teachers, within an individual identification and assessment environment
5. Overcoming the assumption that appears to discriminate in some learning environments for English Language /Gifted and Talented learners from that English fluency limitations indicate a lack of academic and creative potential.

#### **6.2.6 Understanding Creativity within English Language Learner Characteristics**

Understanding what gifted and talented creative English Language Learner characteristics and traits look and sound like, would assist teachers and parents in recognizing and identifying them within mixed ability English Language Learner classrooms. Whether they demonstrate these behaviours in Arabic first language or English second language, cultural expression or in response to school based classroom learning tasks with creativity and higher literacy than their peers, advocating for more effective learning tasks could create transparency once educators are familiar with the creative characteristics and traits of English language learners. This specific knowledge for educators sheds light on the limited single lens of only considering standardized tests to identify high ability students learning needs.

#### **6.2.7 Collaborative Learning in Rapidly Changing Education Environments to Address Learning Barriers for High Ability Students**

The study initially revealed barriers in a learning environment that was experiencing an evolving and rapidly changing education system. Obstacles that were found to be particularly relevant were; language barriers for English language learners that restricted effective identification and productive social interaction in collaborative creative activities. Future Problem Solving encouraged collaborative elaboration of original ideas that resulted in students constructing understandings together that were observed to be difficult to achieve in other classes where collaborative learning environments were rare.

### 6.3 Final Recommendations for Further Research

The potential to investigate the impact of Future Problem Solving for high ability students on creativity development in English Language Learning in other languages, could possibly strengthen these findings. Investigating the impact of Future Problem Solving to develop creativity for high ability boys could also be an area worthy of possible future exploration.

Finally, further exploration of the impact of Future Problem Solving on developing creativity for high ability students would benefit from a wider sample.

Torrance states ‘developing creativity is important from the standpoint of personality development and mental health; it contributes importantly to the acquisition of information...and is essential in the application of knowledge to daily personal and professional problems’ (Torrance, 1962). Acknowledging the development of creativity in learners’ positive impact upon success in other curriculum areas could strengthen students’ personality development and mental positive health.

Inspiration for further study can be found in the following student participant concluding self-description.

*‘Give me a problem and I will show you who I am. Being creative isn’t how I think; it is who I am.’*

Student participant Grade 7, 2017

## *References*

- Abu Dhabi eGovernment Gateway. *Education Reforms in Abu Dhabi*. (June 2014). Retrieved from [www.abudhabi.ae](http://www.abudhabi.ae)
- Amabile, T. M. (1983). *The social psychology of creativity*. New York: Springer Verlag.
- Assouline, S. G. & Colangelo, N. G. (2000). Counseling gifted students, In K. A. Heller, F. J. Mönks, R. Subotnik and R. J. Sternberg (Eds.), *The International Handbook of Giftedness and Talent* (2<sup>nd</sup> ed.), (pp.595-608). Waco, TX: Prufrock Press.
- Baker, M.J. (1999). Argumentation and Constructive Interaction. In G. Rijlaarsdam & E. Espéret (Series Eds.) & Pierre Coirier and Jerry Andriessen (Vol. Eds.) *Studies in Writing: Vol. 5. Foundations of Argumentative Text Processing*, 179-202. Amsterdam: University of Amsterdam Press.
- Bloom, B.S. 1994. Reflections on the development and use of the taxonomy. in: Anderson, L.W., & Krathwohl, D.R., (eds), *Bloom's taxonomy: a forty-year retrospective*. National Society for the study of education, Chicago.
- Brennan, M. & Noffke, S.E. (2009). Social-political theory in working with teachers for social justice schooling. In S.E. Noffke & B. Somekh (Eds.), *The SAGE handbook of educational action research* (pp.432-441). London, UK: SAGE Publications.
- Burton, N., Brundrett, M., & Jones, M. (2008). *Doing your education research project*. Los Angeles: Sage
- Carr, W. & Kemmis, S. (1986). *Becoming critical*. Lewes, UK: Falmer.
- Clark, B. (2002). *Growing Up Gifted* (6<sup>th</sup> ed.). Upper Saddle River, NJ: Merrill Prentice Hall.
- Cohen, L., Manion, L., & Morrison, K. (2000). *Research methods in education* (5th ed). London; New York: Routledge Falmer.

- Colangelo, N., & Davis, G. A. (2003). *Handbook of gifted education* (3rd ed.). Boston: Allyn and Bacon.
- Creswell, J. W., Plano Clark, V. L., Gutmann, M., & Hanson, W. (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 209–240). Thousand Oaks, CA: Sage.
- Dąbrowski, K. (1966). "The Theory of Positive Disintegration". *International Journal of Psychiatry*. 2: 229–44.
- Delisle, J., & Galbraith, J. (2002). *When gifted kids don't have all the answers: How to meet their social and emotional needs*. USA: Free Spirit publishing.
- Fromm, E. (1959). The creative attitude. In H. H. Anderson (Ed.), *Creativity and its cultivation* (pp. 44-54). New York: Harper & Row.
- Gagné, F. (1985). Giftedness and talent: A re-examination of the definitions. *Gifted Child Quarterly*, 29, 103-112.
- Gagné, François: *My Convictions About the Nature of Abilities, Gifts, and Talents in Journal for the Education of the Gifted*, Vol. 22, No. 2, 1999, p. 109-136
- Gardner, H. (1993) *Multiple intelligences: the theory in practice*. New York: Basic Books
- GOTCHA Project; Academic Excellence program, under the Office of Bilingual Education and Language Minority Affairs, U.S. Department of Education Retrieved from <http://www.kreative-kids.com> 11<sup>th</sup> November 2016
- Gordon, W. J. J. (1961). *Synectics*. New York: Harper & Row.
- Guilford, J. P. (1950). Creativity. *American Psychologist*, 5, 444-454.

- Guilford, J. P. (1959). Traits of creativity. In H. H. Anderson (Ed.), *Creativity and its cultivation* (pp.142-151). New York: Harper & Row.
- Hattie, J. (2003). *Teachers make a difference: What is the research evidence?* Australian Council for Educational Research Conference, October.
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. London, New York: Routledge.
- Iowa Department of Education (2005). *Guidelines for developing English Language Proficiency Standards in Iowa*. Des Moines, IA: Author.
- Isaksen, S. G., Dorval, K. B., & Treffinger, D. J. (2011). "Creative approaches to problem solving". Sage Publications, Inc.
- Khatena, J., & Torrance, E. P. (1973). *Thinking creatively with sounds and words: Technical Manual (Research Ed.)*. Lexington, MA: Personnel Press.
- Marland, S. P., Jr. (1972). *Education of the gifted and talented: Report to the Congress of the United States by the U.S. Commissioner of Education and background papers submitted to the U.S. Office of Education, 2 vols*. Washington, DC: U.S. Government Printing Office. (Government Documents Y4. L 11/2: G36)
- Maslow, A. H. (1976). Creativity in self-actualizing people. In A. Rothenberg & C. Hausman (Eds.), *The creativity question* (pp. 86-92). Durham, NC: Duke University Press.
- McCoach, D. B., & Siegle, D. (2007). What predicts teachers' attitudes toward the gifted? *The Gifted Child Quarterly*, 51(3), 246-255.
- MacKinnon, D. W. (1978). *In search of human effectiveness: Identifying and developing creativity*. Buffalo, NY: Creative Education Foundation
- Mednick, S. A. (1962). The associative basis of the creative process. *Psychological Review*, 69, 220-232.

Mertler, C.A. (2006). *Action research. Teachers as researchers in the classroom*. Thousand Oaks, Ca: Sage, pp. 1-20.

Moltzen, R. (Ed). (2009). *Gifted and talented. New Zealand perspectives. (3rd Ed)*. Auckland: Pearson Education.

Noffke, S. E., & Somekh, B. (2005). Action research. In B. Somekh & C. Lewin (Eds.), *Research methods in the social sciences* (pp. 89-96). London, UK: SAGE Publications.

Noffke, S. E., & Somekh, B. (2009). Introduction. In S.E. Noffke & B. Somekh (Eds.), *The SAGE handbook of educational action research* (p.1-5). London, UK: SAGE Publications.

Piechowski, M.M. (1991). Emotional development and emotional giftedness. In N. Colangelo and G.A. Davis (Eds.), *Handbook of gifted education* (pp. 285-306). Boston: Allyn and Bacon.

Renzulli, J. S. (1978). What makes giftedness: re-examining a definition. *Phi Delta Kappan*, 60,180-184, 261.

Renzulli, J. S. (1986). The three-ring conception of giftedness: A developmental model for creative productivity. In Sternberg, R. J., & Davidson J. (Ed.) *Conceptions of Giftedness* (pp. 53-92). New York: Cambridge University Press.

*Research Review for the Torrance Tests of Creative Thinking.*( 2000) Bensenville, IL: Scholastic Testing Services,Inc.

Rhodes, M. (1961). An analysis of creativity, *Phi Delta Kappan*, 42, 305-310.

Rogers, C. (1959). Toward a theory of creativity. In H. H. Anderson (Ed.), *Creativity and its cultivation* (pp. 69-82). New York: Harper & Row.

Schmuck, R. A. (2006) *Practical action research for change*. Thousand Oaks, Ca: Corwin Press, pp31-37.

Scholastic Testing Service, Inc. and Future Problem Solving Program International collaborative longitudinal study (2010).

- Somekh, B. (1995). The contribution of action research to development in social endeavours: a position paper on action research methodology. *British Education Research Journal*, 21(3), 339-355.
- Sternberg, Robert J. (ed.): *Definitions and Conceptions of Giftedness*; Corwin Press, Thousands Oaks 2004, p. 79-95
- Tannenbaum, A. J. (1983). *Gifted children: Psychological and educational perspectives*. New York: Macmillan.
- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches*. Thousand Oaks, CA: Sage.
- Tashakkori, A. & Teddlie, C. (2009). *Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioural Sciences*. Thousand Oaks, CA: Sage Publications. ( Chapter 2. Pp.19-39)
- Treffinger, D. J. (1996). *Creativity, creative thinking, and critical thinking: In search of definitions*. Sarasota, FL: Center for Creative Learning.
- Treffinger, et al (2002), *Assessing Creativity: A Guide for Educators*  
Retrieved from <https://files.eric.ed.gov/fulltext/ED505548.pdf> 16<sup>th</sup> September 2018.
- Tomal, D.R., (2003). *Action research for educators*. Lanham, MA: The Scarecrow Press
- Torrance, E. P. (1962). *Guiding Creative Talent*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Torrance, E. P. (1962). Predictive validity of the Torrance tests of creative thinking. *Journal of Creative Behaviour*, 6, 232-252.
- Torrance, E. P. (1978). Giftedness in solving future problems. *Journal of Creative Behavior*, 12 (2), 75-86
- Torrance, E. P. (1994). *Creativity: Just wanting to know*. Pretoria, South Africa: Benedict Books.

Torrance, E. P. (2000). Research review for the Torrance Test of Creative Thinking. Bensenville, IL: Scholastic Testing Services, Inc.

*Using the TTCT to guide the teaching of creative behavior.* (1987). Bensenville, IL: Scholastic Testing Services, Inc.

Wallach, M. A., & Kogan, N. (1965). Modes of thinking in young children. New York: Holt, Rinehart & Winston.

## Appendices

### **Appendix 1: Introduction Letter**

#### **The impact of the International Future Problem Solving Programme on the development of creativity for Gifted and Talented**

#### **Information for the Participating School Principal, parents and students and responding teachers.**

My name is **Bronwyne Rankin** and I am a teacher and Academic Vice Principal, investigating the topic of creativity development within a specific programme; Future Problem Solving, in order to further my understanding of developing the creative potential of Gifted and Talented children. I am undertaking this research as part of the requirements for a Master of Education degree at the University of Canterbury, New Zealand. I will be working under the supervision of Associate Professor **Una Cunningham** and Professor **Janinka Greenwood**.

Within the Masters course EDEM 690, I would like to collect and analyse data of 26 student's writing and creative learning responses in their Future Problem Solving and other classes. Responding teachers who work in Arabic and English will be asked to complete a questionnaire, showing their observations of various creative characteristics in the participating students. This data will allow me to gain some insight into the students' growth in creativity for identified Gifted and Talented students and the possible impact development of creativity through Future Problem Solving may have on learning in the class curriculum.

Community Consultation meetings will be held in at the beginning of the study and at the start of each Trimester to describe and discuss the study process and content.

Participation is voluntary. Participants will have the right to withdraw from the study at any stage and/or to withdraw information or data without penalty. Participants will be guaranteed anonymity as real names or any identifying information of teachers and schools will not be used. All records will remain confidential and access to data will be restricted to myself, and my supervisors. The data will be securely stored and retained for up to five years following completion of the study. Data will be used in my Masters of Education thesis and may be presented at conferences or possibly published in articles.

If you have any complaint concerning the manner in which this research project is conducted please contact:

Bakhita Al Neyadi, Principal Atekah Bint Abdul Mutalib School, Abu Dhabi Education Council  
Al Ain, United Arab Emirates

If you have any questions about involvement in this research now or throughout the process of the study you may contact myself on 056 9750624 or [bronwyne.rankin@adec.ac.ae](mailto:bronwyne.rankin@adec.ac.ae) Alternatively you may wish to contact my supervisors Una Cunningham [una.cunningham@canterbury.ac.nz](mailto:una.cunningham@canterbury.ac.nz) or Janinka Greenwood [janinka.greenwood@canterbury.ac.nz](mailto:janinka.greenwood@canterbury.ac.nz) . If you are willing to participate, please complete the attached consent form and return to me.

Yours sincerely,

Bronwyne Rankin

## **Appendix 2: Parent /Caregiver Declaration of Participation Consent**

### **The impact of the International Future Problem Solving Programme on the development of creativity for Gifted and Talented**

I consent to allow my daughter to participate in the study involving quantitative data gathering for a study in Canterbury University's EDEM 690, Master in Education Thesis over the period of one year.

I have read and understood the information provided to me concerning the quantitative data gathering procedures and I understand what will take place if consent is granted.

I understand that the information I provide will be treated as confidential and that no findings that could identify either: the school, my daughter or me will be published. I am safe in the knowledge that all information will be securely filed.

I understand that my daughter's participation in the project is voluntary and that I may withdraw her participation at any time throughout the study.

Parent's Name:

Student's Name:

Signature:

Date:

### **Appendix 3: Principal Declaration of Consent for participation of Abu Dhabi Education Council School**

As Principal of \_\_\_\_\_,  
I consent to the participation of 26 high ability students within this school for data gathering towards Bronwyne Rankin's study on **The impact of the International Future Problem Solving Programme on the development of creativity for Gifted and Talented**, contributing towards understandings within her, University of Canterbury, Christchurch, New Zealand, Master EDEM 690, EducationThesis.

I have read and understood the information provided to me concerning the methodology and process of data gathering.

I understand what will take place if consent is granted.

I understand that the information the school will provide will be treated as confidential and that no findings that could identify: the school, the students or me will be published. I am safe in the knowledge that all information will be securely filed.

I understand that the school's participation in the study is voluntary and that I may withdraw participation at any time.

Abu Dhabi Education Council Ethics Representative

Name:

Signature:

Date:

## **Appendix 4: Information for Questionnaire Respondents**

### **The impact of the International Future Problem Solving Programme on the development of creativity for Gifted and Talented Questionnaire Participants Information**

My name is **Bronwyne Rankin** and I am investigating the topic of creativity development in high ability learners in order to further my understanding of the creative potential of Gifted and Talented children and the impact of creativity development upon curriculum learning. I am undertaking this research as part of the requirements for a Master of Education degree at the University of Canterbury, New Zealand. I will be working under the supervision of Professor **Una Cunningham and Professor Janinka Greenwood**.

English and Arabic teacher respondents will be asked to complete a questionnaire during a staff meeting in March 2016. Questionnaires will take approximately 15 minutes to complete. Completed questionnaire will be collected after completion.

Participation is voluntary. Respondents will have the right to withdraw from the study at any stage and/or to withdraw information or data without penalty. Respondents will be guaranteed anonymity as real names or any identifying information of teachers and schools will not be used. All records will remain confidential and access to data will be restricted to myself and my supervisors. The questionnaire and data will be securely stored and retained for up to five years following completion of the study. Data will be used in my M Ed thesis and may be presented at conferences and published in articles.

The Principal as a representative of Abu Dhabi Education Council has reviewed and approved this study. If you have any complaint concerning the manner in which this research project is conducted please contact the Principal;

Principal Bakhita Al Neyadi  
Atekah Bint Abdul Mutalib  
Al Ain  
United Arab Emirates

If you have any questions about involvement in this research you may contact myself on 056 9750624 or [bronwyne.rankin@adec.ac.ae](mailto:bronwyne.rankin@adec.ac.ae) Alternatively you may wish to contact my supervisors Una Cunningham [una.cunningham@canterbury.ac.nz](mailto:una.cunningham@canterbury.ac.nz) or Janinka Greenwood [janinka.greenwood@canterbury.ac.nz](mailto:janinka.greenwood@canterbury.ac.nz) . If you are willing to participate, please complete the attached consent form and return to me.

Yours sincerely

*Bronwyne Ranki*

**Appendix 5: Consent Form for Questionnaire Literacy of Teacher Respondents**

**The impact of the International Future Problem Solving Programme on the development of creativity for Gifted and Talented**

**Consent Form for Questionnaire of Literacy Teacher Respondents**

I have read and understood the Information Sheet for Bronwyne Rankin’s ‘**The development of creativity for Gifted and Talented**’ questionnaire.

I understand that the study involves completing a questionnaire in March 2016 and one year later.

I understand that I may withdraw my involvement at any time.

I am aware that this study has been reviewed and approved by the Principal as representative of the Abu Dhabi Education Council ethics approval process and that if I have any concerns about the content or conduct of this study I can contact the Principal.

**Name of Respondent:** .....

**Respondent’s signature:** .....

**Date:** .....

## **Appendix 6**

### **Creative English Language Characteristics Literacy Teacher Questionnaire Pre- Test**

The following questionnaire is attempting to identify a correlation between the creative skills of English language learners and learning behaviours that may lead to success in the curriculum. The creative characteristics are those identified by the teachers in this school as those most likely to lead to success in the classroom. The data offered will be compared to the creative learning behaviours focused on in the Future Problem Solving programme in an attempt to answer the question:

*Could Future Problem Solving skills offer opportunity for students to access and engage more effectively in other curriculum areas?*

This question is part of a Master's research paper I am completing through Canterbury University, New Zealand.

The questionnaire will take 5-10 minutes. You will answer 8 questions in the questionnaire recording your observations on individual student's English Language Learner's unique creative abilities. These 8 questions are divided into three categories: School based characteristics, Language based characteristics and Cultural based characteristics.

## Appendix 7

### Creative English Language Characteristics Literacy Teacher Questionnaire

Instruction: Indicate your response by circling the appropriate agreement:

**1 Strongly Dis-agree    2 Disagree    3 Uncertain    4 Agree    5 Strongly Agree**

Observation Student Name and Grade: \_\_\_\_\_ Student Research Identification Code: \_\_\_\_

	Strongly Disagree	Dis-agree	Uncertain	Agree	Strongly Agree
<b>Language based characteristics</b>					
Shows a willingness and ability to translate for her peers.	①	②	③	④	⑤
Uses literacy skills that may be well above other English language learners.	①	②	③	④	⑤
Is able to switch between English and Arabic easily.	①	②	③	④	⑤
Shows superior knowledge of phrases and humour.	①	②	③	④	⑤
<b>Culture based characteristics</b>					
Shows strong self- efficacy, pride and confidence in both Arabic and Western English culture.	①	②	③	④	⑤
Demonstrates respect for cultural differences in multiple learning environments.	①	②	③	④	⑤
<b>School based characteristics</b>					
Shows a high ability in Arabic literacy compared to her peers.	①	②	③	④	⑤
Is advanced in creative skills specifically 1 or more of: fluency, flexibility, originality and elaboration.	①	②	③	④	⑤